

# Marc Dann Declaration in Support of Motion for Class Certification

## Exhibit 5

## **CURRICULUM VITAE**

**Kanwaljeet S. Anand**

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A handwritten signature in blue ink, reading "K.S. Anand", with a long horizontal flourish extending to the right.

## **CURRICULUM VITAE**

Name: **Kanwaljeet S. Anand**

Address: 770 Welch Road, #435, Palo Alto, CA 94304

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### **Education:**

1981	M.B.B.S.	Mahatma Gandhi Memorial Medical College, University of Indore, Indore, India.
1986	D.Phil.	Jesus College, University of Oxford, Oxford, U.K.
1991	F.A.A.P.	American Academy of Pediatrics, Elk Grove Village IL, USA
1997	F.R.C.P.C.H.	Royal College of Pediatrics and Child Health, London, U.K.
1998	F.C.C.M.	American College of Critical Care Medicine, Anaheim CA, USA.

### **Postdoctoral Training:**

1980 - 1980	Intern, Maharaja Yeshwantrao Hospital, Indore, India
1980 - 1981	Intern, Hindu Rao Hospital, Delhi, India
1981 – 1982	House Officer, Department of Pediatrics, Maharaja Yeshwantrao Hospital, Indore, India
1982 - 1983	Senior House Officer, Special Care Baby Unit, Department of Paediatrics, John Radcliffe Hospital, Oxford, U.K.
1988 - 1991	Internship and Residency in Pediatrics, Department of Medicine, Children's Hospital, Boston, Massachusetts, U.S.A.
1991 – 1993	Clinical Fellow, Neonatal and Pediatric Intensive Care Units, Massachusetts General Hospital, Boston, Massachusetts, U.S.A.

### **Licensure and Certification:**

1981	Registered Medical Practitioner, Madhya Pradesh Board, Bhopal, India.
1982	Limited Registration, General Medical Council, London, U.K.
1988	Massachusetts Board of Registration in Medicine, Boston, MA, (License No. 75047)
1991	Board Certification in Pediatrics, American Board of Pediatrics (valid 1991-1998)
1993	Composite State Board of Medical Examiners, Atlanta, GA (License No. 037123)
1993	Controlled Substance Registration, Drug Enforcement Administration, U.S. Department of Justice (License No: BA2998687, expires June 30, 2018)
1994	Board Certification, Sub-Board in Pediatric Critical Care, American Board of Pediatrics (Re-certified in 2004 and 2014, expires December 31, 2023)
1994	Basic Life Support (BLS Certification), American Heart Association (expires August, 2019)
1994	Pediatric Advanced Life Support (PALS Certification), American Heart Association (expires August, 2019)
1995	Advanced Cardiac Life Support (ACLS Certification), American Heart Association (expires August, 2019)
1997	Arkansas State Medical Board, Little Rock, Arkansas (License No. E-1508)
2009	Board of Medical Examiners, Nashville, Tennessee (License No. MD045154)

- 2015 The Medical Board of California, Sacramento, CA (License No. C138692)  
 2016 Advanced Trauma Life Support, American College of Surgeons (No. 644546)  
 (expires April 16, 2020).

### **Academic Appointments:**

- 1983 - 1985 Rhodes Scholar and Research Fellow, University Department of Paediatrics, University of Oxford, Oxford, U.K.  
 1985 - 1988 Research Fellow in Anesthesia, Harvard Medical School, Boston, MA.  
 1988 - 1991 Clinical Fellow in Pediatrics, Harvard Medical School, Boston, MA.  
 1991 - 1993 Fellow in Pediatrics, Harvard Medical School, Harvard University, Boston, MA.  
 1993 - 1997 Assistant Professor of Pediatrics and Anesthesia, Emory University School of Medicine, Atlanta, GA.  
 1994 - 1997 Assistant Professor of Psychiatry and Behavioral Sciences, Emory University School of Medicine, Atlanta, GA.  
 1994 - 1997 Director for Critical Care Research, Department of Pediatrics, Emory University School of Medicine, Atlanta, GA.  
 1995 - 1996 Interim Director, Office for Research Promotion, Department of Pediatrics, Emory University School of Medicine, Atlanta, GA.  
 1997 - 2000 Associate Professor of Pediatrics and Anesthesiology, College of Medicine, University of Arkansas for Medical Sciences, Little Rock, Arkansas.  
 1997-2003 Section Chief, Critical Care Medicine, Department of Pediatrics, University of Arkansas for Medical Sciences, Little Rock, Arkansas.  
 1998 - 2000 Associate Professor of Anatomy & Neurobiology, College of Medicine, University of Arkansas for Medical Sciences, Little Rock, Arkansas.  
 2001-2009 Professor of Pediatrics, Anesthesiology, Pharmacology, Neurobiology & Developmental Sciences, College of Medicine, University of Arkansas for Medical Sciences, Little Rock, Arkansas.  
 2001-2009 Morris & Hettie Oakley Endowed Chair for Critical Care Medicine, University of Arkansas for Medical Sciences, Little Rock, Arkansas.  
 2009-2014 St. Jude Chair for Excellence in Critical Care Medicine; St. Jude Children's Research Hospital, Memphis, TN.  
 2009-2015 Professor of Pediatrics, Anesthesiology, Anatomy & Neurobiology, Principal Investigator, UT Neuroscience Institute, University of Tennessee Health Science Center, Memphis, TN.  
 2015-2016 Division Chief, Pediatric Critical Care Medicine, Department of Pediatrics, Stanford University School of Medicine, Palo Alto, CA.  
 2015-present Professor of Pediatrics, Anesthesiology, Perioperative & Pain Medicine, Stanford University School of Medicine, Palo Alto, CA.

### **Professional Awards**

- 1982-1985 Rhodes Scholarships for India, University of Oxford, U.K.  
 1986 ***Dr. Michael Blacow Award*** for the Best Paper presented at the 58<sup>th</sup> Annual Meeting of the British Paediatric Association, York, U.K.  
 1989 The ***Von L. Meyer Award for Research*** at Children's Hospital, Boston.  
 1992 ***Pediatric Resident Research Award***, American Academy of Pediatrics

- 1994 Inaugural recipient, ***Young Investigator Award in Pediatric Pain***, International Association for the Study of Pain, Special Interest Group for Pain in Children, Philadelphia, PA.
- 1995 6<sup>th</sup> Annual ***Dr. Fred J. Vlazny Humanitarian Award*** and Visiting Professorship, Medical College of Wisconsin, Milwaukee WI.
- 2000 ***Jeffrey Lawson Award for Advocacy in Children's Pain Relief***, 19<sup>th</sup> Annual Scientific Meeting, American Pain Society
- 2001 Inaugural Recipient, ***Morris & Hettie Oakley Endowed Chair for Critical Care Medicine***, University of Arkansas for Medical Sciences and Arkansas Children's Hospital, April 13<sup>th</sup>, 2001.
- 2007 The ***Father Joseph Biltz Award*** from JCCA (formerly the NCCJ of Arkansas) for promoting inter-faith harmony in Arkansas.
- 2007 ***Joan M. Cranmer "Mentor of the Year" Award***, Department of Pediatrics, University of Arkansas for Medical Sciences.
- 2008 ***"Salute to Greatness" Individual Award*** from the Dr. Martin Luther King Commission, State of Arkansas, January 18<sup>th</sup>, 2008.
- 2006-2008 **Vice-Chair and Chair of the Research Committee**, Society of Critical Care Medicine
- 2009 ***The Nils Rosén von Rosenstein Award***, an international award given to Pediatricians every 5 years by the Swedish Society of Medicine & Swedish Paediatric Society, April 23, 2009.
- 2010 Inaugural recipient, ***The St. Jude Chair of Pediatric Critical Care Medicine***, University of Tennessee Health Science Center and St. Jude Children's Research Hospital, March 31<sup>st</sup>, 2010.
- 2011 ***Mentor Award***, School of Graduate Studies, University of Arkansas for Medical Sciences, July 2011.
- 2013 9<sup>th</sup> Annual ***"In Praise of Medicine Award"***, Erasmus University Centenary Celebration, Faculty of Medicine, Rotterdam, The Netherlands; October 4, 2013.
- 2015 ***Journées Nationales de Néonatalogie***, Keynote Address at The Pasteur Institute, Paris, France; March 26<sup>th</sup>, 2015.
- 2015 ***Respect for Nursing Award*** from the PICU Nurses and Nursing Leadership, Lucile Packard Children's Hospital, Palo Alto, CA.
- 2016 ***Nightingale Excellence Award***, the only physician who has received this honor by Stanford Children's Healthcare and Lucile Packard Children's Hospital, Stanford University, Palo Alto, CA; October 25<sup>th</sup>, 2016.
- 2019 ***Honorary Doctorate***, Faculty of Medicine and Health, University of Örebro, Örebro, Sweden.

### **Honors and Professional Recognition:**

- 1968-1974 Merit Certificates, The Daly College, Indore, India
- 1975 M.P. State Science Talent Scholarship, Madhya Pradesh, India
- 1977-1978 Merit Students Scholarship, University of Indore, India
- 1977 University Gold Medal for Anatomy, University of Indore, India
- 1987 Listed in ***American Men and Women in Science***
- 1988 Honorary Life Membership in the National Neonatology Forum, India.
- 1989 Keynote Address: First European Conference on Pediatric Pain, June 1989,

- Maastricht, The Netherlands
- 1990 Keynote Address: 44<sup>th</sup> Annual Congress, Svensk Forening for Anesteshioch Intensivvard, Huddinge, Sweden.
- 1990 Keynote Address: 4<sup>th</sup> Annual John Lind Symposium, Trollhattan, Sweden.
- 1991 Who's Who Among Rising Young Americans, Citation Directories, USA.
- 1992 Men of Distinction, Cambridge University Press, Cambridge, U.K.
- 1993 International ***Who's Who in Medicine***
- 1993 International Scientific Committee, 3<sup>rd</sup> International Meeting of Pediatric Intensive Care, Padova, Italy.
- 1993 Scientific Planning Committee, Symposium on Pain and Stress in the Newborn, National Institute of Child Health and Human Development.
- 1994 Co-Chair, NICHD Symposium on "Neonatal Pain: Physiology and Management", June 1994, Philadelphia PA, U.S.A.
- 1995 Moderator for Maternal and Newborn Health Symposium in Child Health 2000, 2<sup>nd</sup> World Congress & Exposition, May 30 - June 3, 1995, Vancouver, Canada
- 1995 Keynote Address: Nordic Congress on Children and Pain, September 7-9 1995, Stockholm, Sweden.
- 1995 Keynote Address: XVII Annual Congress of the Dutch Paediatric Association, November 1, 1995, Veldhoven, The Netherlands.
- 1996 International Scientific Committee, 2<sup>nd</sup> World Congress on Pediatric Intensive Care, June 1996, Rotterdam, The Netherlands.
- 1996 Plenary Lecturer in Pediatric Pain, 8<sup>th</sup> World Congress on Pain, International Association for the Study of Pain, August 17-22 1996, Vancouver (B.C.).
- 1997 International Scientific Advisory Committee, 4<sup>th</sup> International Symposium on Pediatric Pain, International Association for the Study of Pain, Helsinki, Finland.
- 1997 Member of the U.S. Rhodes Scholars Selection Committee, State of Arkansas.
- 1997 Member, International Selection Committee for the 2<sup>nd</sup> Young Investigator Award for Pediatric Pain, Special Interest Group on Pediatric Pain, International Association for the Study of Pain.
- 1997 Elected to Fellowship, Royal College of Paediatrics & Child Health, U.K.
- 1998 Elected to Fellowship of the American College of Critical Care Medicine.
- 1998 Listed in Marquis' *Who's Who in Science and Technology*
- 1999 Chairman, 2<sup>nd</sup> International Consensus Conference on Guidelines for Procedural Pain Management in Infants, August 21, 1999; Baden, Austria.
- 1999 Keynote Address : International Symposium on "Basic Mechanisms and Recent Advances in Pediatric Pain", German Pediatric Association, University of Erlangen, Kloster Weltenberg, Germany, October 29-31, 1999.
- 1999 Keynote Address: III<sup>rd</sup> Congreso Internacional De Clinica Del Dolor Y Cuidados Paliativos, Asociacion Mexicana De Algologia A.C., Ciudad y Puerto de Veracruz, Veracruz, México, October 31<sup>st</sup> to November 2<sup>nd</sup>, 1999.
- 1999 Keynote Address: Fifth Greater Tulsa Area Pain Conference, University of Oklahoma, Tulsa OK, October 1, 1999.
- 1999 Plenary Podium Presentation: 52<sup>nd</sup> Annual Meeting, American Academy of Pediatrics, Washington DC, October 9<sup>th</sup> to 15<sup>th</sup>, 1999.
- 1999 Member, Board of Directors, Arkansas Children's Hospital Research Institute
- 2000 Keynote Address: International Symposium on Infant Pain, Karolinska

- Institute, Stockholm, Jan 25<sup>th</sup>, 2000.
- 2000 Keynote Address: Danish Pediatric Society, University Hospital of Copenhagen, Denmark, Jan 21<sup>st</sup>, 2000.
- 2000 Keynote Speaker: “Pain in Children: Conquering the Hurt”, The Hospital for Sick Children, Pain Awareness Week, Toronto, March 31<sup>st</sup>, 2000.
- 2000 Co-Chair, Pharmacology, Pain & Sedation Track, 3<sup>rd</sup> World Congress of Pediatric Intensive Care, Montreal, Canada, June 24-29, 2000.
- 2000 Plenary Lecture, 5<sup>th</sup> International Symposium on Pediatric Pain, Special Interest Group for Pain in Children, International Association for the Study of Pain, London, U.K., June 19<sup>th</sup>, 2000.
- 2000 Public Lecture, The European Institute of Health and Medical Sciences at the University of Surrey, Chertsey, Surrey, U.K.; June 21<sup>st</sup>, 2000.
- 2000 Plenary Speaker, 3<sup>rd</sup> World Congress on Pediatric Intensive Care, Montreal, Canada; June 26<sup>th</sup>-29<sup>th</sup>, 2000.
- 2000 **Baxter Plenary Speaker**, 6<sup>th</sup> Annual Meeting of the Society for Pediatric Anesthesia, Sanibel, FL.
- 2001 Keynote Address: 10<sup>th</sup> Annual Symposium on Neonatal-Perinatal Medicine, University of Michigan, Ann Arbor, MI; April 26<sup>th</sup>, 2001.
- 2001 Listed in **Strathmore’s Who’s Who**, 2001-2002 Edition
- 2001 Plenary Presentation, 14<sup>th</sup> Annual Meeting of the Canadian Pain Society, Montreal, Canada, May 10<sup>th</sup>, 2001.
- 2001 Keynote Speaker, 3<sup>rd</sup> Nordic Congress on Pain in Children, Stockholm, Sweden, Sept 12<sup>th</sup>, 2001.
- 2002 Honorary Secretary, U.S. Rhodes Scholarships Selection Committee, State of Arkansas
- 2002 Steering Committee Member, National Summit on Race 2002, Little Rock
- 2002 Editorial Board, *Critical Care Medicine*, Williams & Wilkins Publishers
- 2002 Editorial Board, *Biology of the Neonate*, Karger A.G. Publishers
- 2002 Pfizer Visiting Professorship in Pain Medicine, Department of Pediatrics, Wayne State University and Detroit Children’s Hospital, Detroit, MI, June 3-6, 2002.
- 2002 Member of the National Planning Group, NICHD/FDA Newborn Drug Development Initiative
- 2002 Plenary Speaker, 18<sup>th</sup> European Congress of Perinatal Medicine, June 19 – 22, 2002, Oslo, Norway.
- 2002 Keynote Speaker, 28<sup>th</sup> Annual Congress, German Society of Neonatology and Pediatric Intensive Care, June 27 – 29, 2002, Mainz, Germany.
- 2002 Keynote Speaker, 4<sup>th</sup> International Forum on Pediatric Pain, September 19 - 22, 2002, White Point Beach, Nova Scotia, Canada.
- 2002 Keynote Speaker, International IPOKRaTES Seminar on "Neonatal Comfort and Care" Oct 10-12, 2002, Gmunden, Austria.
- 2002 **Lesley Cooper Memorial Lecture**, 20<sup>th</sup> Neonatal Course for Senior Paediatricians, Imperial College of Medicine, November 25-29, 2002, London, England.
- 2003 Member of the Research Committee, Society of Critical Care Medicine.
- 2003 Pfizer Visiting Professorship in Pain Medicine, Department of Pediatrics, Baylor University and Texas Children’s Hospital, Houston TX, Feb 19-21, 2003.



- 2003 **Arnold J. Rudolph Memorial Grand Rounds**, Department of Pediatrics, Baylor University and Texas Children's Hospital, Houston, TX.
- 2003 **Chairman, Neonatal Pain Task Force**, FDA/NICHD Newborn Drug Development Initiative
- 2003 Keynote Address, Opening Ceremony of the EURAIBI (Europe Against Infant Brain Injury) Congress, June 6, 2003, Siena, Italy (live broadcast of opening ceremony to 125 countries by Reuters International).
- 2003 **Chairman, Pharmacology, Analgesia & Sedation Track**, 4<sup>th</sup> World Congress on Pediatric Intensive Care, Boston MA, June 16-20, 2003.
- 2003 Listed in **Who's Who in America**, 58<sup>th</sup> Edition, Marquis Who's Who, Inc.
- 2003 Member, Pediatric Pharmacology Research Study Section (ZHD1 DSR-A-01), National Institute for Child Health and Human Development
- 2003 Keynote Address: Annual Meeting of the Perinatal Research Society, Charleston SC, September 12-14, 2003.
- 2003 Member, Pediatrics Subcommittee Study Section (ZHD1 CHHD-A-01), National Institute for Child Health and Human Development
- 2004 **Windermere Honorary Lecturer** (presented to Her Royal Highness Princess Anne), 8<sup>th</sup> Spring Meeting, Royal College of Paediatrics and Child Health, York (UK).
- 2004 Expert Witness, U.S. Supreme Court, Department of Justice for the Partial-Birth Abortion Ban Act of 2003, April 6<sup>th</sup>, 13<sup>th</sup> and 15<sup>th</sup>, 2004.
- 2004 Keynote Speaker, 4th Nordic Congress on Children and Pain, Linköping, Sweden; May 5-7, 2004.
- 2004 Member, Loan Repayment Program Study Section (ZHD1 DSR-A LRP), National Institute for Child Health and Human Development.
- 2004 Keynote Speaker, 10<sup>th</sup> International Postgraduate Course in Neonatal Intensive Care, Buenos Aires, May 17-19, 2004.
- 2004 **Laurie Edmunds Keynote Speaker**, University of Massachusetts Medical School, June 2, 2004, Marlboro, MA.
- 2004 International Editorial Board, **Anesthesia Pediatrica e Neonatale** (Pediatric and Neonatal Anesthesia)
- 2004 Elected to membership of the **American Pediatric Society**
- 2005 Listed in **Who's Who in America**, 2005 (59<sup>th</sup> Edition), Marquis' Who's Who, Inc.
- 2005 Editorial Board, **Pain**, official journal of the International Association for the Study of Pain.
- 2005 John S. Liebeskind Visiting Professorship, Departments of Pediatrics, Medicine, Psychology, History, Sociology, Anthropology, University of California at Los Angeles, April 29<sup>th</sup>, 2005.
- 2005 **"World News Tonight" for ABC News** Interviewed for the latest research on pain in infants and children, May 10<sup>th</sup>, 2005.
- 2005-2006 **Vice-Chair, Research Committee, Society of Critical Care Medicine.**
- 2005 Faculty Advisor, Graduate School of Studies, University of Arkansas for Medical Sciences
- 2005 VIP Member, **Continental Who's Who** registry of National Business Leaders.
- 2005 Arkansas Hospital Association, Judges' Merit Award in Advertising (3<sup>rd</sup> place in the Special Visuals Category for Dr. Martin Luther King Day lecture).
- 2005 Expert Witness testimony in relation to the **Unborn Child Pain Awareness**



- 2005 **Act of 2005 (H.R. 356)**, before the Subcommittee on the Constitution, U.S. House Committee on the Judiciary, 109<sup>th</sup> U.S. Congress, November 1<sup>st</sup>, 2005.
- 2005 **Gregory Mark Taubin Distinguished Lecturer** at Children's National Medical Center, Department of Pediatrics, George Washington University School of Medicine, Washington DC, December 7<sup>th</sup>, 2005.
- 2006 **Inaugural Visiting Professor**, University of Utah School of Pharmacy, Department of Pharmaceutics, January 10<sup>th</sup>, 2006.
- 2006 **Pfizer Visiting Professor in Pain Medicine**, Department of Pediatrics, University of Utah and Primary Children's Hospital, Salt Lake City, January 10-12, 2006.
- 2006 Member of the ALSDAC Committee of the Food & Drug Administration (FDA), U.S. Public Health Service, Department of Health & Human Services
- 2006 Chairman, Special Task Force for Anesthesia & Analgesia Drugs, National Institute for Child Health & Human Development.
- 2006 Study Section Member, National Institute for Mental Health
- 2006 Study Section Member, Clinical Trials Division, National Heart, Lung & Blood Institute
- 2006 **Keynote Speaker**, 12<sup>th</sup> Annual Ruth Rappaport Seminar on Pediatric Pain Management: The Technion: Israel Institute of Technology, Haifa, Israel.
- 2006 **Keynote Address**, 2006 Annual Meeting, Society for Pediatric Anesthesia, Chicago, IL.
- 2006 Research work cited by Dr. Jane Qiu in *Nature* 444(9): 143-145, 2006.
- 2007 Member, Special Emphasis Panel, NIH/National Center for Research Resources
- 2007 Member, Future of Research Task Force, Society of Critical Care Medicine
- 2007 The Medical Home Model for Children After Life-threatening Illness or Injury: Member of a National Experts' Panel
- 2007 Member, Special Emphasis Panel, NIH/National Institute for Neurological Disorders and Stroke
- 2007-2013 **American Board of Pediatrics**, Sub-Board of Critical Care Medicine, 6-year term (2007-2013).
- 2007 Featured speaker, **The 'Child in Mind' Project** for training Pediatric Faculty by The Royal College of Pediatrics & Child Health
- 2007-2013 Listed in *America's Top Pediatricians*, Consumers' Research Council of America
- 2007 Featured speaker, "Dispatches" Program: *Abortion - What We Need to Know*, reported by Deborah Davies, BBC Channel 4 on October 17<sup>th</sup>, 2007.
- 2008 Board Member, Critical Care Educational & Research Foundation, Society for Critical Care Medicine
- 2008 **Keynote Speaker**, Special Meeting of the British Parliament (House of Commons) on January 28<sup>th</sup>, 2008.
- 2008 Study Section Reviewer, National Institute of Neurological Disorders and Stroke, ZNS1 SRB-M(57), March 10<sup>th</sup>, 2008.
- 2008 The **National Academy of Sciences**, Institute of Laboratory Animal Research, Expert Consultant for "Recognition and Alleviation of Pain in Laboratory Animals".
- 2009 **Keynote Speaker**, Pediatric Palliative Care Conference, University Hospital, University of Medicine and Dentistry of New Jersey, Newark, NJ; October 10,

- 2009
- 2009 **6<sup>th</sup> Annual Josephine Templeton Honorary Lecture**, The Children's Hospital of Philadelphia, Department of Anesthesiology & Critical Care Medicine, Philadelphia, PA; September 24, 2009.
- 2009 Expert Consultant, Pediatric Analgesic Clinical Trials, Division of Analgesia, Anesthesia, and Rheumatology Products, Center for Drug Evaluation and Research, Food and Drug Administration, Baltimore, MD; December 3, 2009.
- 2010 Shelby County and Memphis City Council, Certificates of Appreciation for humanitarian service in Haiti, presented on February 16<sup>th</sup>, 2010.
- 2010 House of Representatives, State of Tennessee, Joint resolution No. 868: recognizing service in Haiti, passed on May 20<sup>th</sup>, 2010.
- 2010 Keynote Speaker, 1<sup>st</sup> Annual Mississippi Perinatal Association Conference on July 8, 2010.
- 2010 Community Service Award, **Memphis Rotary Club**, March 30, 2010.
- 2010 **Study Section Member**, Loan Repayment Program, National Institute for Neurological Disorders & Stroke (NINDS), July 2010.
- 2010 Keynote Speaker, 8<sup>th</sup> Annual Ron Lemire Symposium on Contemporary Pediatric Critical Care Medicine, University of Washington and Seattle Children's Hospital, August 27<sup>th</sup>, 2010.
- 2010 Invited Speaker, "Open Hearts, Open Minds, & Fair Minded Words", International Conference on Life and Choice in the Abortion Debate, Princeton University, October 16, 2010.
- 2010 Keynote Speaker, Frontiers in Pain Research Lecture Series, McGill University and Alan Edwards Centre for Research on Pain, November 4, 2010.
- 2011 **Summit Level Award** at the MSQPC Quality Award Ceremony, **Greater Memphis Chamber of Commerce**, February 24, 2011
- 2011 Keynote Speaker, Brain Awareness Week, UT Neuroscience Institute and The Urban Child Institute, March 24, 2011
- 2011 Member of the Executive Council, Special Interest Group on Pain in Children, International Association for the Study of Pain
- 2011 Keynote Speaker, Premature Newborn Symposium, Mayanei HaYeshua Medical Center, Bnei Brak, Tel Aviv, Israel, May 10, 2011
- 2011 **Scientific Expert**, Anesthetic and Life Support Drugs Advisory Committee (ALSDAC), Center for Drug Evaluation and Research, U.S. Food & Drug Administration
- 2011 **AMA Seed Research Grant Award**, received by Dr. Bonny Bardhan from the American Medical Association.
- 2011 **Chair, Selection Committee, Distinguished Investigator Award in Pediatric Pain**, on behalf of International Association for the Study of Pain, Special Interest Group for Pain in Children
- 2011 Keynote Speaker, International Cardiac Surgery Conference, Fortis Escorts Heart Institute & Research Center, New Delhi, India; December 28, 2011
- 2012 Keynote Speaker, Danish International Conference on Pediatric Trauma in Odense, Denmark; January 16, 2012
- 2012 **Inaugural Address**, 2<sup>nd</sup> International Obstetrical & Neonatology Congress, Máxima Medisch Centrum Hospital, Veldhoven, The Netherlands, March 8, 2012
- 2012 **Sujit & Uma Pandit Visiting Professorship**, Department of Anesthesiology,

- 2012 University of Michigan Health Systems, Ann Arbor, MI; March 29, 2012  
Keynote Speaker, 48<sup>th</sup> Annual Meeting of the Japanese Society of Perinatal & Neonatal Medicine; Saitama, Japan, July 8 - 10, 2012.
- 2013 Listed in *Who's Who in America* 2002-2013, Marquis Who's Who, Inc.
- 2013 Listed in *America's Top Doctors*, Castle Connolly Medical, Ltd.
- 2013 Listed in *Best Doctors in America*, Best Doctors, Inc.
- 2013 **Dr. Digby Leigh Distinguished Speaker**, 51st Clinical Conference in Pediatric Anesthesia, University of Southern California and Children's Hospital Los Angeles, Anaheim, CA; February 9, 2013
- 2013 **Dr. Jackson Rees Distinguished Lecture**, 14<sup>th</sup> Jackson Rees Symposium, Sophia Children's Hospital, Rotterdam, The Netherlands; October 5, 2013.
- 2013 Dean's Faculty Advisory Committee, College of Medicine, University of Tennessee Health Science Center, Executive Dean and Vice Chancellor, Dr. David M. Stern.
- 2013 Chair, Promotion & Tenure Committee, Department of Pediatrics, University of Tennessee Health Science Center.
- 2014 Annual Neonatology Keynote, Pediatrics Section, Combined Sections Meeting of the American Physical Therapy Association (APTA), Las Vegas, Nevada; February 4-6, 2014.
- 2014 Keynote Speaker, 3<sup>rd</sup> Annual Neonatal & Pediatric Pearls (NAPP) Conference, UCLA Department of Pediatrics and Mattel Children's Hospital, Mumbai, India; February 8-9, 2014.
- 2014 5<sup>th</sup> Annual **Dr. I. David Todres, MD Grand Rounds**, Department of Pediatrics, Harvard Medical School and Massachusetts General Hospital, Boston, MA; June 2-3, 2014.
- 2014 Keynote Speaker, Health Beliefs and Practices Forum, Health Ministry Network of the Mid-South, Catholic Center, Memphis TN. August 14, 2014.
- 2014 **Chair, Selection Committee, Distinguished Investigator Award in Pediatric Pain**, on behalf of International Association for the Study of Pain, Special Interest Group for Pain in Children
- 2014 Listed in *Who's Who in America*, Marquis Who's Who, Inc.
- 2014 Listed in *America's Top Doctors*, Castle Connolly Medical, Ltd.
- 2014 Listed in *Best Doctors in America*, Best Doctors, Inc.
- 2014 Keynote Speaker, 33<sup>rd</sup> Annual Neonatal & Perinatal Conference, Chile Association of Pediatrics, Santiago, Chile; August 21-23, 2014.
- 2014 Member, NIH Study Section (CSR) ZRG1 SBIB-V (82), National Institutes of Health, Center for Scientific Review, October 23<sup>rd</sup>, 2014.
- 2014 14<sup>th</sup> Annual **Dr. John J. Fangman Lectureship**, Department of Pediatrics, Children's Hospital and Clinics – Minneapolis, MN; October 27-28, 2014.
- 2015 International Advisory Group, Leading Causes of Life: *Towards an Integrative Paradigm of Health*; Wake Forest University, Winston-Salem, NC; February 24-27, 2015.
- 2015 Appointed as **Fellow of the Leading Causes of Life Initiative**, Wake Forest University, Winston-Salem, NC.
- 2015 10<sup>th</sup> International Symposium on Pediatric Pain, International Association for the Study of Pain, Distinguished Investigator Award Presentation, Seattle, WA; May 31-June 4, 2015.
- 2015 Keynote Speaker, XIV International Congress of Intensive Care Medicine,

- Belo Horizonte, Brazil; May 21-23 2015.
- 2015 Member, Special Emphasis Panel for STTR Applications, *Eunice Kennedy Shriver* National Institute for Child Health & Human Development/NIH, October 29<sup>th</sup>, 2015.
- 2015 Executive Committee Member for the Pediatric Pain Research Network (PPRN), the Pediatric Section of the ACTION Network.
- 2016 *Ad hoc* Member, NICHD Study Section, Special Emphasis Panel/Scientific Review Group 2016/01 ZHD1 DSR-K (90)
- 2016 *Ad hoc* Member, Center for Scientific Review 2016/10 ZRG1 PSE-D (90), Neurological, Aging & Musculoskeletal Epidemiology (NAME) Study Section
- 2017 Co-Chair, International Conference on “*Collaborations for the Ideal Village*”, Stanford University School of Medicine, June 17<sup>th</sup>, 2017.
- 2017 *Ad hoc* Member, Center for Scientific Review, 2018/01 SBIB-H82, Clinical Fetal & Pediatric Applications Study Section, February 10<sup>th</sup>, 2017.
- 2017 Member, Pediatric Pain Consensus Task Force, Ethical Guidelines for Pediatric Pain Research, The MayDay Fund, August-December, 2017.
- 2017 Master of Ceremonies, 50<sup>th</sup> Anniversary Gala Dinner, The Sikh Foundation International, Asian Art Museum, San Francisco, CA; May 5<sup>th</sup>, 2017.
- 2017 Chair, Healthcare Panel, International Conference “*Advancing Sikhs through Education*”, Stanford University, Palo Alto, CA; May 7<sup>th</sup>, 2017.
- 2017 Member, Center for Scientific Review, 2018/01 SBIB-H82, Study Section, Clinical Fetal & Pediatric Applications, October 11<sup>th</sup>, 2017.
- 2017 **Chief Guest**, 37<sup>th</sup> Annual Meeting of the National Neonatology Forum Conference Inauguration, December 8<sup>th</sup>, 2017.
- 2017 Member, Consensus Task Force, Ethical Guidelines for Pediatric Pain Research, The MayDay Fund
- 2018 Co-Chair, International Conference on “*Empowerment of Women for the Ideal Village*”, Stanford University School of Medicine, June 26<sup>th</sup>, 2018.
- 2018 **NIH Study Section Chair**, Center for Scientific Review, 2018/02 SBIB-H82, Clinical Fetal & Pediatric Applications
- 2019 **Honorary Doctorate**, Faculty of Medicine and Health, University of Örebro, Örebro, Sweden (conferred on February 9<sup>th</sup>, 2019)
- 2019 Co-Chair, 4<sup>th</sup> Annual Ideal Village Conference on “*Corporate Social Responsibility*”, Stanford University, June 25<sup>th</sup>, 2019.

#### **Scientific Groups:**

Life Member	National Neonatology Forum, India
Fellow	American Academy of Pediatrics
Fellow	Royal College of Paediatrics & Child Health
Fellow	American College of Critical Care Medicine
Fellow	Leading Causes of Life Initiative
Member	American Pediatric Society
Member	Society of Critical Care Medicine
Member	International Association for the Study of Pain (IASP)
Member	American Association of Rhodes Scholars

#### **Current Positions:**

- Professor of Pediatrics, Anesthesiology, Perioperative & Pain Medicine

- Director, Pain Neurobiology Laboratory, Women & Child Health Research Institute, Stanford University School of Medicine
- Attending Intensivist, Lucile Packard Children's Hospital
- Director, Jackson Vaughan Critical Care Research Fund
- Section Editor, *Pediatric Research*

### **Research Grants Awarded:**

- 1983      Co-Investigator: "Hormonal and metabolic effects of surgery and anesthesia in the human newborn infant". National Medical Research Fund (U.K.). P.I.: Dr. Albert Aynsley-Green: \$18,000 (Jan. 1984 - June 1985).
- 1983      Laboratory research training grant, The Rhodes Trust (U.K.), \$2,200 (Oct. 1982 - Sept. 1985).
- 1983      Principal Investigator: Microanalytical methods for measurement of hormones and intermediary metabolites." Medical Research Fund, University of Oxford (U.K.) \$1,500, (Aug. 1983 - June 1984).
- 1984      Principal Investigator:: "Glucose homeostasis in premature newborn infants undergoing surgery." Mason Medical Research Fund (U.K.), \$3,000. (October 1984 - October 1985).
- 1984      Co-investigator: "Amino acid metabolism and acute phase reactants related to perioperative metabolism in neonates". Peel Medical Research Fund (U.K.) P.I.: Dr. Albert Aynsley-Green: \$2,000 (June 1984 - May 1985).
- 1984      Principal Investigator: "Micromethods for insulin and glucagon radioimmunoassays in human plasma." Locally Organized Research Grant, Oxfordshire Health Authority, Oxford (U.K.) \$2,600 (March 1984 - June 1985).
- 1985      Principal Investigator: "Evaluation of neonatal anesthetic techniques by measurement of stress responses.: Locally Organized Research Grant, Oxfordshire Health Authority, Oxford (U.K.) \$2,400 (July 1985 - Dec. 1985)
- 1986      Co-Investigator: "Effects of high-dose opioids on the physiological responses of neonates undergoing cardiac surgery." Janssen Research Foundation, P.I.: Paul R. Hickey, M.D. \$60,000 (Jan. 1986 - Dec. 1987)
- 1989      Principal Investigator: "Assessment of pain in premature neonates." The Von L. Meyer Research Fund, Children's Hospital, Boston MA. \$1,500 (Sept. 1989).
- 1993      Principal Investigator: "Developmental physiology of pain in newborn infants." U.S. Sprint, Inc.: \$20,000 (July 1993 - June 1995)
- 1993      Principal Investigator: "Neurobiological effects of pain and stress during fetal and neonatal development." Emory Eggleston Children's Research Center, \$330,000



(July 1993 - June 1996).

- 1994 Principal Investigator: Unrestricted research funds. International Association for the Study of Pain and Astra Pain Control AB, Sweden; \$10,000 (Oct. 1994-Oct. 1995).
- 1994 Mentor: "Design and development of a prospective database of analgesic practices in term and preterm neonates." American Academy of Pediatrics, Resident Research Grants, 1994, Applicant: Joel D. Selanikio, M.D. \$2,000 (Fall 1994).
- 1995 Co-Investigator: The Measurement and Assessment of Pain in Infants and Children less than 3 years: the development of an instrument in relation to hormonal stress responses and morphine plasma levels. (P.I.'s: Prof. Dick Tibboel & Prof. J. Passchier) Dutch Medical Research Council, D.fl. 510,425 (March 1995 - February 1998).
- 1995 Principal Investigator: "Treatment of pain in newborn infants." U.S. Sprint Foundation, Inc.: \$15,000 (July 1995 - June 1996)
- 1996 Mentor: "Does the severity of surgical stress predict clinical outcome in surgical neonates and children?" Summer Research Fellowships, Emory University School of Medicine, Applicant: Bryan Wall (M1), \$ 4,000 (May-August, 1996)
- 1996 Principal Investigator: "Neurobiologic and behavioral effects of neonatal pain"; National Institutes of Child Health & Human Development (HD01123), \$ 210,424 (Sept 1996-Aug 1999).
- 1996 Co-Investigator: "The Assessment of Pain in Severely and Profoundly Mentally Retarded Children". (P.I.'s: Prof. Huda H. Abu-Saad, Prof. Dick Tibboel) Dutch Organization for Scientific Research, D.fl. 537,660 (October 1996 - September 2001).
- 1998 Mentor: "Long-term effects of pain and self-regulation of behavior in preterm neonates" (P.I.: Marlene Walden, RNC, Ph.D., NNP) Faculty Scientist Award, Nell Hodgson Woodruff School of Nursing, Emory University, Atlanta, \$120,000 (September 1998 to April 2000).
- 1998 Principal Investigator: "Tissue Cryo-sectioning: the Gateway to Laboratory Bench Research" (Shared equipment grant), Competitive Research Grants, CUMG Research Fund, University of Arkansas for Medical Sciences, \$ 14,693 (September 1998 to August 1999).
- 1998 Co-Investigator: "Ultra-cold Freezer Storage of Research Samples" (Shared equipment grant, PI: Dr. Farrar), Competitive Research Grants, CUMG Research Fund, University of Arkansas for Medical Sciences, \$ 15,000 (September 1998 to August 1999).
- 1999 Principal Investigator: "Neurologic Outcomes & Pre-emptive Analgesia in



Neonates” (The NEOPAIN Multicenter Trial) 1R01 HD36484, National Institute of Child Health & Human Development, \$ 1,513,766 (June 1999 to May 2004).

- 1999      Principal Investigator: How do neonatal experiences alter brain development and subsequent behavior? Blowitz-Ridgeway Foundation, \$100,000 (Oct 1999-2001).
  
- 2000      Principal Investigator: Does neonatal isolation lead to apoptosis in the developing brain? Medical Research Endowment Fund, University of Arkansas for Medical Sciences, \$15,000 (Jan - Dec 2000).
  
- 2000      Principal Investigator: Methadone analgesia in full-term neonates: an assessment of pharmacokinetics and pharmacodynamics. Children’s University Medical Group, University of Arkansas for Medical Sciences; \$19,218 (7/1/2000 – 5/31/2001).
  
- 2000      Mentor: Effects of neonatal isolation on apoptosis during brain development. Arkansas Perinatal Board (P.I.: Adnan Bhutta, M.D.; \$1,000 (9/1/2000 – 8/31/2001)).
  
- 2001      Mentor: “Cerebral Autoregulation in Preterm Infants” (P.I.: Jeffrey R. Kaiser, MD, MA) Clinical Investigator Development Award (K23 NS43185 Grant), NINDS/NIH, \$ 684,760 (Jun 2002 to May 2007).
  
- 2001      Applicant: Proposal for building a state-of-the-art Pediatric Intensive Care Unit at Arkansas Children’s Hospital, Donald W. Reynolds Foundation (Other Applicants: David T. Berry, Jonathan R. Bates, M.D.; \$8,540,000 (9/1/2001 – 08/31/2003).
  
- 2002      Program Support: Arkansas Center for Pain Research, Initiated Act I funds to Arkansas Children’s Hospital Research Institute; \$300,000 (July 2001 - 2004).
  
- 2003      Mentor: “*Effects of adverse neonatal experience on cortical subplate neurons*” (Principal Investigator: Barbara Clancy, Ph.D.; University of Central Arkansas) Faculty Summer Grant, Arkansas Biomedical Research Infrastructure Network. \$ 16,700 (May-August, 2003).
  
- 2003      Co-Investigator: “*Impact of Adverse Early Experience on Mental Health*” (Principal Investigator: Delia Vazquez, M.D.; University of Michigan at Ann Arbor) National Institute for Mental Health (1R21 MH068489-01) Direct Costs: \$ 688,500 (July 2003 – June 2006).
  
- 2003      Mentor: “*The assessment of chronic arthritis pain in patients with dementia*” (P.I.: Pao-Feng Tsai, RN, Ph.D.) John A. Hartford Post-Doctoral Fellowship, Building Academic Geriatric Nursing Capacity Scholar Fund, John A. Hartford Foundation Grant number: 03-204; \$100,000 (July 2003-June 2005).
  
- 2003      Mentor: “*Acquisition of a Three-Dimensional Neuroanatomical Analysis System*” (P.I.: Barbara Clancy, Ph.D.) Arkansas BRIN Equipment Grant, \$27,257 (July 2003 – June, 2004).

- 2003 Mentor: “*Mechanisms of repetitive pain-induced neuronal cell death*” (Principal Investigator: Deborly Wade, Ph.D.; Central Baptist College) Faculty Grant, Arkansas Biomedical Research Infrastructure Network. \$16,667 (September, 2003 – June, 2004).
- 2003 Mentor: “*Equipment grant for Molecular Biology methods*” (Principal Investigator: Deborly Wade, Ph.D.; Central Baptist College) Faculty Grant, Arkansas Biomedical Research Infrastructure Network. \$25,331 (September, 2003 – December, 2003).
- 2004 Co-Investigator: “*The Effect of Tai Chi on Cognitive Function in Elders with Dementia and Pain*” (P.I.: Pao-Feng Tsai, RN, Ph.D.) Alzheimer Disease Center UAMS: \$45,779 (April 2004-March 2005).
- 2004 Mentor: Center for Translational Neuroscience, COBRE Project III: “*Early Pain Experience and Pre-attentional Mechanisms*” National Center for Research Resources (1P20 RR018765) \$10,439,884 (September 2004 to August 2009).
- 2004 Co-Investigator: “*The Effect of Tai Chi on Cognitive Function in Elders with Dementia and Pain*” (P.I.: Pao-Feng Tsai, RN, Ph.D.) Alzheimer Disease Association: \$199,997 (Oct 2004-Sept. 2006).
- 2004 Mentor: “*Effects of Adverse Perinatal Experiences on Cortical Organization*” (P.I.: Barbara Clancy, Ph.D.) INBRE Summer Research Fellowship, \$8,334 (June 2004 – October, 2005).
- 2004 Principal Investigator: “*PCCM Network: Remedies for Opioid Tolerance & Withdrawal*” National Institute for Child Health and Human Development (NIH# 1U10 HD050009-01), \$1,987,796 (May 2005 – November 2009)
- 2004 Principal Investigator: “*Inflammatory changes in the Immature Brain following Perinatal Pain*” SURF (SILO Undergraduate Research Fellowship for UCA student: Shannon Palmer), \$ 3,900 (Jan. – August, 2005).
- 2005 Principal Grantee: Pfizer Visiting Professorship in Pain Medicine Grant (\$7,500) to invite Professor John van den Anker, Professor of Pediatrics, Pharmacology, Physiology; George Washington University School of Medicine and Health Sciences; Children’s National Medical Center, Washington, DC.
- 2005 Mentor for Project #8: “*Effects of Adverse Perinatal Experiences on Cortical Organization Mechanisms*”; Arkansas INBRE Grant “*Cellular Signaling, Growth, and Differentiation*”, (P.I.: Lawrence E. Cornett, Ph.D.) NIH/National Center for Research Resources (2 P20 RR016460-04; \$ 16,908,508; June 2005 to May 2010).
- 2006 Principal Investigator: “*Use of Acupuncture to reduce Inflammatory Pain in Infants: A translational approach*” Arkansas Biosciences Institute \$ 49,869 (October 2006 – June 2008).

- 2006 Principal Investigator: “*Near-continuous, Non-invasive Blood Pressure Monitoring to improve outcomes in Pediatric Transport*” Dean’s Research Development Fund \$ 14,919 (January 2006 – December 2007).
- 2006 Principal Investigator: “*Pain Assessment in Cognitively Impaired, Functionally Impaired Children (PACIFIC Study)*” Children’s University Medical Group Seed Grant; \$30,000 (January 2007 – December 2008).
- 2007 Co-Principal Investigator: (P.I. Hugo Lagercrantz) “*NeoOpioid Consortium: No pain during childhood by adapting off-patent medicines*”, European Commission FP7 Program: HEALTH-2007-4.2-1: Adapting off-patent Medicines for Paediatric populations (Euro 2,300,000; October, 2008 to October, 2013).
- 2008 Principal Investigator: “*Safety and Efficacy of Acupuncture for Relieving Pain in Newborn Infants*”, The Mayday Fund, (\$401,884; July, 2008 to December, 2013).
- 2008 Principal Investigator: “*Assessment of the Pharmacokinetics, Pharmacodynamics, and Neurotoxic Effects of an Anesthetic in Infants undergoing various Surgical Procedures*” Safety of Key Inhaled and Intravenous Drugs in Pediatrics (SAFEKIDS), Food & Drug Administration, FDA-SOL-08-SAFEKIDS, Clinical Project 003 (\$308,000; October, 2008 to September, 2012).
- 2008 Primary Mentor: “*Goal-directed Resuscitative Interventions during Pediatric Inter-facility Transport (the GRIPIT Trial)*” (P.I.: Michael H Stroud, M.D.) Eunice Shriver Kennedy National Institute for Child Health & Human Development, Pediatric Research LRP Program, \$44,924.64 (July 1, 2008 – June 30, 2012).
- 2011 Principal Investigator: “*Development of the newborn brain and exposure to anesthetic agents*” The Oxnard Foundation (\$ 75,859.92 – July 01, 2011 to June 30, 2014).
- 2011 Primary Mentor: “*Steroids for Pediatric Acute Lung Injury Trial*” (P.I.: Bonny Bardhan, M.D.; 2<sup>nd</sup> Year Fellow), American Medical Association Foundation, Seed Grant Research Program, \$2,500.00 (April 1, 2011 – March 30, 2013).
- 2013 Mentor: “*The role of 2-pore domain potassium channel Trek-1 in Acute Lung Injury*”, (P.I.: Dr. Andreas Schwingshackl), American Lung Association (ALA) Biomedical Research Grant (\$80,000; October, 2013 – October, 2015).
- 2013 Site P.I.: “*Multiple Medical Therapies for Pediatric TBI – A Comparative Effectiveness Approach*” (P.I.: Mike Bell), National Institute for Neurological Disorders & Stroke (NIH/NINDS), Cooperative Agreement grant (U01 NS081041, July, 2013 – June, 2018).
- 2014 Co-Mentor: “*The role of 2-pore domain potassium channels in Acute Lung Injury*”, (P.I.: Dr. Andreas Schwingshackl), National Heart, Lung & Blood

Institute (NIH/NHLBI) Mentored Clinical Scientist Development Award (1 K08 HL118118: \$676,890, February, 2014 to January, 2019).

- 2014 Principal Investigator: “*Science to Survival: Innovative Strategies for Critically Ill or Injured Children*”; National Institute for Child Health & Human Development, \$1,522,280 (1 UG1 HD083173: Approved by NICHD Council, awaiting allocation of funds, Dec. 2014 – Nov. 2019).
- 2014 Co-Mentor: “*Morphine Pharmacogenomics to Predict Risk of Respiratory Depression in Children*”, (P.I.: Dr. Vidya Chidambaran), Eunice Kennedy Shriver National Institute for Child Health & Human Development (NIH/NICHD) Mentored Patient-Oriented Research Career Development Award (K23) (5K23HD082782: \$655,425; July 2014 to June 2019).
- 2015 Principal Investigator: “*Biomarkers for Risk and Resilience in Critically Ill Children*”; Anand Lab Startup Fund, Department of Pediatrics, Stanford University School of Medicine, \$1,500,000 (Oct. 2015 – Nov. 2020).
- 2017 Primary Mentor: “*Measuring Pain in Newborn Infants: Developing objective approaches at the bedside*”, (P.I.: Dr. Iris Morag), Feldman Family Foundation Visiting Professorship to Stanford University (\$50,000; August 2017 to 2018).
- 2017 Principal Investigator: “*Biomarkers of Risk and Resilience in Preschool Children*” Maternal & Child Health Research Institute, Stanford University (Total costs \$34,999.56).
- 2018 Co-Principal Investigator: STTR Grant Proposal: “*Measuring Infant Pain Objectively using Sensor Fusion & Machine Learning Algorithms*”, in response to RFA-DA-18-013, NIH/NIDA “Development of a Device to Objectively Measure Pain (R41/R42)”; in collaboration with Autonomous Healthcare, Inc. (1 R41 DA046983; Total Costs: \$224,999; Stanford sub-contract: \$ 118,958; Dates: September 01, 2018 to August 31, 2020).
- 2019 Co-Investigator: Research Instrumentation Grant: “*Xevo TQ-XS Triple Quadrupole Mass Spectrometer System*” (P.I. Allis Chien) NIH Office of the Director (1 S10 OD026962-01; Total Costs: \$527,209; Dates: February 01, 2019 to January 31, 2020).
- 2019 Principal Investigator: R01 Grant Proposal: “*Do Hair Cortisol and Hair Oxytocin represent the Stressful and Supportive Experiences of Preschool Children?*” Eunice Kennedy Shriver National Institute for Child Health & Human Development (NIH/NICHD) (1 R01 HD099296-01; Budget: \$2,494,333; Dates: August 01, 2019 to May 31, 2023).

### **Teaching and Lab Supervision:**

#### **High School Seniors:**

1. Brandon Mack (June – August, 2002)
2. Russell Saltz (June – August, 2002)

3. Sarah Bransford (June – August, 2002)
4. Julie Holt (June – August, 2002)
5. Carrie Acrey (June – August, 2002)
6. Michael Reid (June – August, 2002)
7. RaElle Jackson (June to August, 2003)
8. Jerry Choate (August 2003 to May 2004)
9. Nisha Kunapalli (July to Nov., 2005)
10. Gail Khaidakov (July 2005 to Jan. 2006)
11. Janelle Vircks (March-Dec, 2011)
12. Aidan Rubio (June-August, 2017)
13. Ginikachi Ozioma Amuzie (June-August, 2017)
14. Herman Saini (June-August, 2019)

#### **Undergraduate Students:**

1. Hosefa Divan (May - Sept, 1994)
2. Sheela Bavikatty (Sept 1994 – Apr 1995)
3. Jaime E. Estrada (Apr – Dec, 1995)
4. Peter Kim (June – Aug, 1997)
5. Sarah Hopkins (May – Dec, 1997)
6. Matthew Saltz (June - Aug, 1999 & 2000)
7. Kendra Williams (June – Aug, 1999)
8. Michael Bishop (June – Aug, 2000)
9. Robin Morris (June – Aug, 2000)
11. Stephen Baker (June – Aug, 2001)
10. Drew Newton (June – Aug, 2001)
11. Patrick Kennedy (June – Aug, 2002)
12. Brandy Tharp (June – Aug, 2002)
13. Michael Reid (May to August, 2003)
14. Julie Carter (June to Sept., 2003, 2004)
15. Brian Bowden (June - Sept., 2003, 2004)
16. Debbie Sollener (June-Sept, 2003, 2004)
17. Amanda Plummer (Jun-Sep, 2003, 2004)
18. Kate Street (June to Sept., 2003, 2004)
19. Danny Glassman (June-Sept 2003, 2004)
20. Lauren Leach (June to Sept., 2004)
21. Brian Ray (June to Sept., 2004)
22. Blythe Bowman (June to Sept., 2004)
23. Jason Fletcher (June to Sept., 2004)
24. Sarabeth Bailey (June to Sept., 2004)
25. Whitney Tharp (June to August, 2005)
26. Brandon Kersh (June to August, 2005)
27. Shannon Palmer (Jan. to August, 2005)
28. Sarasijha Desikan (June to August, 2006)
29. Jessie Rose (January, 2007, Tufts Univ.)
30. Jamie Waldron (June to August, 2007)
31. Cemeka Augbaum (June-August, 2007)
32. Sarah Latham (May to August, 2008)
33. Greg O’Ryan-Johnson (May-Aug, 2012)
34. Stephanie Allen (May to August, 2013)
35. Anqi Zheng (June to Sept., 2014)
36. Yannick Boni (June to August, 2015)
37. Hannah Todd (May-June, 2017)
38. Noor Singh (June to August, 2018)
39. Emily Mendonsa (June-Dec., 2019)

#### **Graduate Students:**

1. Yasmeen Golzar (Wellesley College, Wellesley, MA; January to August, 1999)
2. John Frank (University of Central Arkansas, Biology Program, Fall 2003 – Summer 2004)
3. Tiffany Wallace (University of Arkansas for Medical Sciences, Neuroscience Program, July to October, 2003)
4. Ross Brown (University of Arkansas for Medical Sciences, Neuroscience Program, July 2006 to May 2007)
5. Chaouxuan Dong, (University of Arkansas for Medical Sciences, Neuroscience Program, July 2007 to May 2011)
6. Jitka Hiscox (Stanford School of Engineering, Civil and Environmental Engineering Department, January 2019 to June 2022)

#### **Medical Students:**

1. Howard Silverboard (June – August, 1994), University of Alabama at Birmingham
2. Bryan Wall (May – August, 1996), Emory University School of Medicine
3. Charles Weber (June – Nov, 1999), University of Arkansas for Medical Sciences



4. John Haltom (May – Aug, 2000), University of Arkansas for Medical Sciences
5. Sukhvir K. Chana (Oct-Nov, 2000), University College London, London (UK)
6. Chi Ling Sarah Cheung (Oct 2001-July 2002) Erasmus University School of Medicine, Rotterdam, The Netherlands
7. Matthew Saltz (M2) (May – July, 2002), University of Arkansas for Medical Sciences
8. Robin Morris (M1) (May – July, 2002), University of Arkansas for Medical Sciences
9. Stephen Baker (M2) (May – July, 2003), University of Arkansas for Medical Sciences
10. Dana Jo Coker (M1) (January 2005-July, 2006), University of Arkansas for Medical Sciences
11. Paulomi Mehta (M2), (May 2007 to 2010), University of Arkansas for Medical Sciences
12. Karmen McPherson (M2) (June to August, 2012) University of Tennessee Health Science Center
13. Aaron Kala (M1, M2, M3) (February to August 2013, June-August 2014, December 2014-January 2015), University of Tennessee Health Science Center
14. Anna Zeidman (M1) (December 2019 – May, 2020), Stanford University School of Medicine
15. Janelle Clarise Chavez (June-August 2020), Stanford University School of Medicine

#### **Post-Doctoral Fellows:**

1. **Thomas Bruns, M.D.**, Post-doctoral fellow in Pediatric Emergency Medicine, Emory University Department of Pediatrics, January 1994 to April 1995. Project: “Comparison of the efficacy, adverse effects, costs and patient outcomes in a randomized trial of histoacryl blue vs. suturing for skin closure of lacerations in pediatric patients.”
2. **Joel D. Selanikio, M.D.**, Resident in Pediatrics, Emory University Department of Pediatrics, December 1993 to June 1995. Project: “Analysis of institutional data from a survey of pain and analgesia in neonates.”
3. **Sylvia Garcia, M.D.**, Resident in Pediatrics, Emory University Department of Pediatrics, December 1993 to June 1995. Project: “The clinical basis for monitoring central venous oxygen saturations in critically ill pediatric patients.”
4. **Volkan Coskun, M.D.**, Doctoral graduate of Ankara University, Turkey. December 1995 to August 1997. “Factors determining opioid receptor development using immunohistochemical techniques.”
5. **Markus Sogl**, Medical Technical Analyst from Vienna University and Vienna General Hospital, Austria. July to September 1995. Project: “Cognitive testing in adult rats exposed to repetitive pain in the neonatal period.”
6. **Mandana Ghodrat, Pharm.D.**, Clinical Pharmacist, Emory-Egleston Pediatric Care Foundation, Emory University School of Medicine, December 1995 to July 1996. Project: “Impact of Patient-Controlled Analgesia on the Behavioral Responses of Children undergoing Lumbar Puncture”.
7. **William Lariviere**, Doctoral student, Department of Psychology, McGill University, Montreal, Canada. June to August, 1997. Project: “Fos expression in the developing rat brain associated with noxious stimuli.”
8. **Devika Kommineni, M.D.**, Visiting Scholar, Department of Pediatrics, Emory University School of Medicine, January to August, 1997. Project: “Analgesic practices for Neonatal I.C.U.’s in U.K.”.
9. **Umesh Narsinghani, M.D.**, Critical Care Medicine Fellow, Department of Pediatrics, University of Arkansas for Medical Sciences, July 1999 to June 2001. “Changes in brain development resulting from repetitive neonatal pain.”



Kanwaljeet S. Anand

CURRICULUM VITAE

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10. **Adnan Bhutta**, M.D., Critical Care Medicine Fellow, Department of Pediatrics, University of Arkansas for Medical Sciences, January 1999 to December 2001. "Apoptosis following isolation in the developing rat brain."
11. **Jing-Gen Liu**, Ph.D., Postdoctoral Fellow, Pain Neurobiology Laboratory, Arkansas Children's Hospital Research Institute, December 1998 to January 2000. "Changes in opioid receptor signal transduction associated with repetitive neonatal pain."
12. **Sarita Garg**, Ph.D., Postdoctoral Fellow, Pain Neurobiology Laboratory, Arkansas Children's Hospital Research Institute, February 2001 to December 2003. "Regulators of neuronal cell death following inflammatory pain."
13. **Lingling Zhang**, Ph.D., Postdoctoral Fellow, Pain Neurobiology Laboratory, Arkansas Children's Hospital Research Institute, May 2005 to present. "Use of Acupuncture to reduce Inflammatory Pain in Infant Rats."
14. **Micheal Stroud**, M.D., Critical Care Medicine Fellow, Department of Pediatrics, University of Arkansas for Medical Sciences, July 2004 to June 2007. "Near-continuous, non-invasive monitoring of pediatric transport patients."
15. **Muayyad Tailounie**, M.D., Critical Care Medicine Fellow, Department of Pediatrics, University of Arkansas for Medical Sciences, December 2006 to June 2009. "Neuroprotective effects of Ketamine for patients with traumatic brain injury."
16. **Bonny Bardhan**, M.D., Critical Care Medicine Fellow, Department of Pediatrics, University of Tennessee Health Science Center, July 2009 to June 2012. "Randomized placebo-controlled trial of steroids for acute lung injury (ALI)/ acute respiratory distress syndrome (ARDS)."
17. **Kandiss Dukes**, Pharm.D., Pharmacy Resident, University of Tennessee Health Science Center, October 2009 to October 2010. "Use of Methadone and Lorazepam for weaning sedation in PICU patients."
18. **Audra Rouster**, M.D.: Senior Resident and Pediatric Gastroenterology Fellow, Le Bonheur Children's Hospital and New Orleans Children's Hospital, August 2010 to December 2011. "Grantsmanship and Career Planning; Application for the LRP Program Grant funding from NIH/NICHD".
19. **Fabio Savorgnan**, M.D., Critical Care Medicine Fellow, Department of Pediatrics, University of Tennessee Health Science Center, July 2010 to June 2013. "Randomized controlled trial of inhaled Nitric Oxide: early versus late use."
20. **Chaoxuan Dong**, M.D., Ph.D.; Postdoctoral Fellow in Neuroscience, UT Neuroscience Institute, September 2011 to August 2013. "Neurotoxicity of Anesthetic and Analgesic Agents in Neonatal Neural Stem/Progenitor Cells."
21. **Radomir Slominski**, M.D. Postdoctoral Fellow, University of Tennessee Health Science Center, Sept. 2014 to June 2015. "Biomarkers for Early Childhood Stress in Hair Samples."
22. **Rajshri Babeoram Panday**, M.D. Vrije Universiteit Medical Center, Amsterdam, The Netherlands; Research Internship, University of Tennessee Health Science Center, July to December 2015, "Novel Assays for measuring Cytokines in hair samples from children".
23. **Dane Jacobson**, M.D. PCCM Clinical Fellow, Stanford University School of Medicine, Jan 2016 to June 2018, "Prevalence of delirium in Pediatric ICU patients".
24. **Urs Naber**, M.D. PCCM Clinical Fellow, Stanford University School of Medicine, July 2016 to June 2017, "Measurement of infant pain using EEG and other monitors".
25. **Reshma Aramanadka**, M.D. PCCM Clinical Fellow, Post-Graduate Institute for Research & Medical Education, Chandigarh, India; January 2019.

Kanwaljeet S. Anand

CURRICULUM VITAE

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26. **Monica Osbelia Ruiz, M.D.** PCCM Clinical Fellow, Stanford University School of Medicine, July 2019 to June 2022, “Measurement of anxiety in preschool children”.

**Pediatric Critical Care Medicine Fellows:**

- |                               |                                   |
|-------------------------------|-----------------------------------|
| 1. Sharon Holloway, M.D.      | 25. Kimberley Ingram, M.D.        |
| 2. Amirah Daher, M.D.         | 26. Fabio Savorgnan, M.D.         |
| 3. Atul Vats, M.D.            | 27. Rajat Pareek, M.D.            |
| 4. Nandkishore Raghuram, M.D. | 28. Astrid Gutierrez-Zepeda, M.D. |
| 5. Karl Serrao, M.D.          | 29. Cody Tigges, M.D.             |
| 6. Venu Devabhaktuni, M.D.    | 30. Paige Klingborg, M.D.         |
| 7. Ronald Sanders, Jr., M.D.  | 31. Patricia Alleyne, MD          |
| 8. Umesh Narsinghani, M.D.    | 32. Peter “Mike” Mangubat, MD     |
| 9. Adnan Bhutta, M.D.         | 33. Catherine Taylor, MD          |
| 10. Patricia Wankum, M.D.     | 34. Camille Immanuel, MD, MPH     |
| 11. Adriana Lopez, M.D.       | 35. Jagila Wesley, MD             |
| 12. Brian Eble, M.D.          | 36. Mindy Ju, MD                  |
| 13. Basem Al-Saati, M.D.      | 37. Katherine Kruse, MD           |
| 14. Jay Duncan, M.D.          | 38. Catherine Ross, MD            |
| 15. Micheal Stroud, M.D.      | 39. Dane Jacobson, MD             |
| 16. Thomas Bannister, M.D.    | 40. Zahidee Rodriguez, MD         |
| 17. Meredith Denton, M.D.     | 41. Daniel Tawfik, MD             |
| 18. Muyyad Tailounie, M.D.    | 42. David Werho, MD               |
| 19. Laura Ortmann, M.D.       | 43. Lindsey Troy, MD              |
| 20. Katherine Clement, M.D.   | 44. Urs Naber, MD, PhD            |
| 21. David Smith, M.D.         | 45. Meghna Patel, MD              |
| 22. Jonathan Byrnes, M.D.     | 46. Mais Yacoub, MD               |
| 23. Bonny Bardhan, M.D.       | 47. Lara Murphy, MD               |
| 24. Rebecca Shappley, M.D.    |                                   |

**Thesis Advisor / Reviewer:**

1. **Bjorn Larsson, M.D.:** Ph.D. Thesis, Karolinska Institute, Stockholm, Sweden (awarded September, 1994).
2. **Sarah Hopkins:** M.S.P.H. Thesis Advisor, Rollins School of Public Health, Emory University, Atlanta (awarded May, 1997).
3. **Ronald Cary Sanders, Jr. M.D.:** M.S. (Physiology) Thesis Advisor and Fellowship Director, University of Arkansas for Medical Sciences (awarded May, 2000).
4. **Nancy Boumeester, M.D.:** Ph.D. Thesis Advisor, Erasmus University, Rotterdam, The Netherlands (awarded October, 2002).
5. **Sayid M. Maleki, MBBS:** M.D. Thesis Examiner, Department of Pediatrics, Yazd University of Medical Sciences, Yazd, Iran (awarded November, 2002).
6. **Lena Bergqvist, M.D.:** Ph.D. Thesis Advisor, Karolinska Institute, Stockholm, Sweden (currently ongoing).
7. **C.L. Sarah Cheung:** M.D. Thesis Advisor, Erasmus University Medical College, Rotterdam, The Netherlands (passed November 2003).
8. **Cameron Good, M.S.:** Ph.D. Thesis Committee, Neuroscience Program, University of Arkansas for Medical Sciences, Little Rock, Arkansas (passed October 2005).

9. **John Frank, B.S.:** M.S. (Biology) Thesis Advisor and Laboratory Mentor, Biology Program, University of Central Arkansas, Conway, Arkansas (Passed September 2004).
10. **Ross Brown, B.S.:** M.S. (Neuroscience), Thesis Advisor and Laboratory Mentor, University of Arkansas for Medical Sciences, Little Rock, Arkansas (Graduated May, 2007).
11. **Chaoxuan Dong, M.D.:** Ph.D. in Neuroscience, University of Arkansas for Medical Sciences, Little Rock, Arkansas (Graduated May, 2011).

#### **Mentorship for Local / Visiting Faculty:**

1. **Steen Hertel, M.D.,** Consultant Neonatologist and Anesthesiologist from the Hilleroed Hospital, Hilleroed, Denmark. (visit: Sept-Oct, 1996)
2. **Sunit Singhi, M.D.,** Director of Pediatric Critical Care Medicine, Associate Professor, Postgraduate Institute for Medical Education and Research, Chandigarh, India (visit: Nov-Dec, 1997).
3. Research Mentorship for faculty colleagues in the Department of Pediatrics, Emory University School of Medicine: David McLario, M.D.; Rita Helfand, M.D.; Dale Nordenberg, M.D.; Harold Simon, M.D.; Benjamin Gold, M.D.; William Zempsky, M.D.
4. **Marlene Walden, RNC, Ph.D.,** Assistant Professor of Nursing Science, Nell Hodgson Woodruff School of Nursing, Emory University, Atlanta, GA (visit: Feb-March, 1999).
5. Research Mentorship for faculty colleagues in the Department of Pediatrics, UAMS: Mark H. Heulitt, M.D.; Mick Tilford, Ph.D.; Craig Rowlands, Ph.D.
6. **Jeffrey Kaiser, M.D.,** Assistant Professor of Pediatrics, University of Arkansas for Medical Sciences.
7. **Mohd. Ilyas, M.D.,** Assistant Professor of Pediatrics, University of Arkansas for Medical Sciences.
8. **Barbara Clancy, Ph.D.,** Assistant Professor, Department of Biology, University of Central Arkansas.
9. **Shalini Khurana, M.D.,** Instructor in Pediatrics, University of Arkansas for Medical Sciences
10. **Deborly Wade, Ph.D.,** Faculty member, Department of Biology, Central Baptist College, Conway, AR.
11. **Adnan T. Bhutta, M.D.,** Instructor in Pediatrics, University of Arkansas for Medical Sciences
12. **R. Whit Hall, M.D.,** Assistant Professor of Pediatrics, University of Arkansas for Medical Sciences
13. **Pao-Feng Tsai, RN, Ph.D.,** Assistant Professor of Geriatric Nursing, College of Nursing, University of Arkansas for Medical Sciences
14. **Michelle Schober, M.D.,** Assistant Professor of Pediatrics (Critical Care Medicine), University of Utah School of Medicine and Primary Children's Hospital, Salt Lake City, UT.
15. **Ana Theresa Stochero, M.D., M.S.,** Assistant Professor of Pediatrics (Neonatology), National University of Sao Paulo, Sao Paulo, Brazil.
16. **Martin Blakely, MD, FACS,** Assistant Professor of Surgery, University of Tennessee Health Science Center
17. **Samir H. Shah, MD, MBA, FRCPC,** Associate Professor of Pediatrics, University of Tennessee Health Science Center
18. **Andreas Schwingshackl, MD, Ph.D.,** Assistant Professor of Pediatrics, University of Tennessee Health Science Center
19. **Marie Mazel, MD,** Assistant Professor of Pediatrics, University of Tennessee Health Science Center

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20. **Ignasio Federico Nievas**, MD, Assistant Professor of Pediatrics, University of Tennessee Health Science Center
21. **Dai Kimura**, MD, Assistant Professor of Pediatrics, University of Tennessee Health Science Center
22. **Hitesh S. Sandhu**, MD, Assistant Professor of Pediatrics, University of Tennessee Health Science Center
23. **Arun K. Saini**, MD, Assistant Professor of Pediatrics, University of Tennessee Health Science Center
24. **Iris Morag**, MD, Ph.D., Associate Professor of Pediatrics (Neonatology), Tel Aviv University, Israel.
25. **Jorina Elbers**, MD; Assistant Professor of Neurology and Pediatrics, Stanford University School of Medicine, Palo Alto, CA.
26. **Azadeh Fayazi**, MD, Assistant Clinical Professor of Pediatrics, Stanford University School of Medicine, Palo Alto, CA.
27. **Jean-Michel Roue**, MD; Associate Professor of Pediatrics, Brest University Hospital, and University of Western Brittany, Brest, France.

**Honors/Awards to mentored fellows, students and faculty:**

1. Umesh Narsinghani, M.D., FAAP.: Education Scholarship Award, 30<sup>th</sup> International Scientific Symposium of the Society for Critical Care Medicine, Feb 13<sup>th</sup>, 2001.
2. Adnan Bhutta, M.D.: Young Investigator Grant Award, Arkansas Perinatal Society, 2000.
3. Umesh Narsinghani, M.D., FAAP.: First Prize Winner, Annual Student Research Day, University of Arkansas for Medical Sciences, Little Rock; March 22<sup>nd</sup>, 2001.
4. Umesh Narsinghani, M.D., FAAP.: First Prize Winner, Annual Fellows Day, Department of Pediatrics, University of Arkansas for Medical Sciences, Little Rock; May 9<sup>th</sup>, 2001.
5. Brandon Mack, Arkansas School for Math & Science: First Place in Medicine and Health at the *West Central Regional Science Fair* (2003)
6. Brandon Mack, Arkansas School for Math & Science: Second Place in Medicine and Health at the *West Central Regional Junior Academy of Sciences* (2003)
7. Brandon Mack, Arkansas School for Math & Science: Awarded the “Clinical Lab Association Best Life Science Project” at the *West Central Regional Junior Academy of Sciences* (2003)
8. Brandon Mack, Arkansas School for Math & Science: “Arkansas State Science Fair Achievement Award” for First Place in Medicine and Health at the *Arkansas State Science Fair* (2003)
9. Brandon Mack, Arkansas School for Math & Science: Awarded the “Society for Neuroscience Achievement Award” by the Society of Neuroscience Arkansas Chapter (2003)
10. Brandon Mack, Arkansas School for Math & Science: State Intel Science and Engineering Fair (ISEF) Finalist Award (2003)
11. Brandon Mack, Arkansas School for Math & Science: “Scientific American” Award for Outstanding Achievement in Science Education of America (2003)
12. Brandon Mack, Arkansas School for Math & Science: *Arkansas State Science Fair* “Best in State: Second Place Award” (2003).
13. Ronald Sanders, Jr., M.D.: Clinical Investigator Development Award (K08), National Institutes of Health (2003): 1K08 HL074128 – “*Hemangioblastic Progenitors in Acute Lung Injury*”.

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14. Adnan Bhutta, M.D.: 2004 CHCA National Benchmarking Award. Reducing the incidence of blood-stream infection in the PICU.
15. Glenda Hefley, RN, MNSc.: Society of Pediatric Nurses, Annual Meeting April 2004, Research Poster Award: Parent Bed Spaces in the PICU: Perceived Benefits and Concerns of Staff.
16. Michelle Schober, M.D.: Pediatric Critical Care Medicine Scientist Development Award (K12), National Institutes of Health (2004): "*Neurotoxicity from Fentanyl Therapy in Infant Rats*".
17. Amanda Plummer: Arkansas Biomedical Research Infrastructure Network, Annual Research Day, 2<sup>nd</sup> Prize for Undergraduate Research Posters. "*Consequences of Neonatal Pain on Neurodevelopment*".
18. Shannon Palmer: Scholars Undergraduate Research Fellowship, 2005 (SURF Grant \$ 3,900) "*Inflammatory changes in the Immature Brain following Perinatal Pain*".
19. Shannon Palmer: Barry A. Goldwater Scholarship, 2005.
20. Brian Bowden: UCA Student of the Year, 2004.
21. Brian Bowden: Rotary International Fellowship, 2005.
22. Tiffany Wallace: Committee on Women in Neuroscience (C-WIN) Graduate Student Travel Award from the Society for Neuroscience to attend the SFN Annual Meeting, November 12-16, 2005.
23. Michael Stroud. Importance of noninvasive blood pressure monitoring during pediatric transport. Received 1st Prize for the Best Fellow's Day Presentation at the UAMS College of Medicine Fellow's Day, May 16<sup>th</sup>, 2006.
24. Michael H. Stroud: Near-continuous, non-invasive monitoring of pediatric transport patients. First Prize for Fellows' Presentation, American Academy of Pediatrics, Section of Transport Medicine, October 11<sup>th</sup>, 2006.
25. Michael H. Stroud: Accelerated non-invasive monitoring of blood pressure in pediatric transport patients: a randomized trial. Fellows Clinical Research Award, ***Society for Pediatric Research (SPR)***, Pediatric Academic Societies' Meeting, May 7<sup>th</sup>, 2007.
26. Michael H. Stroud, M.D.; R21 Exploratory /Developmental Research Grant Award, *Eunice Kennedy Shriver* National Institute for Child Health & Human Development.
27. Bonny Bardhan, M.D.; 2<sup>nd</sup> Year Fellow in Pediatric Critical Care: "Steroids for Pediatric Acute Lung Injury Trial" nationally competitive award from the Seed Grant Research Program by the American Medical Association Foundation.
28. Stephanie Allen, undergraduate student: First Place – Science Award, National Conference of Alpha Chi Honors Society, St. Louis, 2014.



**BIBLIOGRAPHY:****Peer-Reviewed Publications**

See complete list on Scopus at: <http://www.scopus.com/authid/detail.url?authorId=7101749758>

1. **Anand KJS**, Rovnaghi CR, Rigdon, JR, Qin FF, Tembulkar S, Murphy LE, Barr DA, Gotlib IH, Tylavsky FA. Demographic and psychosocial factors associated with Hair Cortisol Concentrations in preschool children. *Pediatric Research*, 2019, (in press).
2. **Anand KJS**, Rigdon, JR, Rovnaghi CR, Qin FF, Tembulkar S, Bush N, LeWinn K, Tylavsky FA, Davis R, Barr DA, Gotlib IH. Measuring socioeconomic adversity in early life. *Acta Paediatrica*, 2019, Jan 7. DOI: 10.1111/apa.14715. PMID: 30614554.
3. Bearer C, Agostoni C, **Anand KJS**, et al. Toward the elimination of bias in Pediatric Research. *Pediatric Research*, 2019; doi: 10.1038/s41390-019-0583-5. PMID: 31533126
4. **Anand KJS**. Discovering pain in newborn infants. *Anesthesiology* 2019; 131:392–5. PMID: 31233407 DOI: 10.1097/ALN.0000000000002810.
5. Slopen N, Roberts AL, LeWinn KZ, Bush N, Rovnaghi CR, Tylavsky F, **Anand KJS**. Maternal experiences of trauma and cortisol production in early childhood in a prospective cohort. *Psychoneuroendocrinology*, 2018; 98: 168–76. PMID: 30170311 DOI: 10.1016/j.psyneuen.2018.08.027
6. Rovnaghi CR, **Anand KJS**. Pathways from adverse childhood experiences to nervous system dysregulation. *Internal Medicine Review* 2018; 4(10): 1-20 (<https://www.internalmedicinereview.org/index.php/imr/article/download/773/pdf>).
7. Walco GA, Kopecky EA, Weisman SJ, Stinson J, Stevens B, Desjardins P, Berde CB, Krane EJ, **Anand KJS**, Yaster M, Dampier CD, Dworkin R, Gilron I, Lunn, Maxwell L, McDermott M, Raja SN, Schactel B, Turk D. Clinical Trial Designs and Models for Analgesic Medications for acute pain in neonates, infants, toddlers, children, and adolescents: ACTION recommendations. *Pain* 159(2): 193-205, 2018. PMID: 29140927; PMCID: PMC5949239.
8. Berger JT, Villalobos ME, Clark AE, Holubkov R, Pollack MM, Berg RA, Carcillo JA, Dalton H, Harrison R, Meert KL, Newth CJL, Shanley TP, Wessel DL, **Anand KJS**, Zimmerman JJ, Sanders RC Jr, Liu T, Burr JS, Willson DF, Doctor A, Dean JM, Jenkins TL, Nicholson CE; Eunice Kennedy Shriver National Institute of Child Health and Human Development Collaborative Pediatric Critical Care Research Network. Cognitive development one year after infantile critical pertussis. *Pediatric Critical Care Medicine* 19(2): 89-97, 2018. PMID: 29117060; PMCID: PMC5796844.
9. Katewa A, **Anand KJS**, Sahu B. One stage repair of aortic pseudo-aneurysm following central shunt and Tetralogy of Fallot with single pulmonary artery. *World Journal of Congenital Heart Surgery*, 2018. doi: 10.1177/2150135117750566. [Epub ahead of print]. PMID: 29614910.
10. Elbers J, Rovnaghi CR, Golianu B, **Anand KJS**. Clinical profile associated with Adverse Childhood Experiences: The advent of nervous system dysregulation. *Children* 2017; 4 (11). pii: E98. doi: 10.3390/children4110098. PMID: 29140276 PMCID: PMC5704132.
11. **Anand KJS**. Defining Pain in Newborns: Need for a new taxonomy? *Acta Paediatrica* 2017; 106(9): 1438-1444. doi: 10.1111/apa.13936, PMID: 28556311.
12. Schwingshackl A, **Anand KJS**. Work-Life Balance: Essential or Ephemeral? *Frontiers in Pediatrics* 2017; 5:108. doi: 10.3389/fped.2017.00108. PMID: 28540286.



13. McGuire JK, Schwingshackl A, **Anand KJS**. Pediatric ARDS –“Reaching for the horizon”. *Frontiers in Pediatrics* 2017; 15 (5): 100. DOI: 10.3389/fped.2017.00100. PMID: 28555176.
14. **Anand KJS**, Eriksson M, Boyle EM, Avila-Alvarez A, Andersen RD, Sarafidis K, Polkki T, Matos C, Lago P, Papadouri T, Attard-Montalto S, Ilmoja ML, Simons S, Tameliene R, van Overmeire B, Berger A, Dobrzanska A, Schroth M, Bergqvist L, Courtois E, Rousseau J, Carbajal R; EUROPAIN survey working group of the NeoOpioid Consortium. Assessment of continuous pain in newborns admitted to NICUs in 18 European Countries. *Acta Paediatrica* 2017, 106(8): 1248-1259. DOI: 10.1111/apa.13810. PMID: 28257153.
15. Carcillo JA, Dean JM, Holubkov R, Berger J, Meert KL, **Anand KJS**, Zimmerman JJ, Newth CJL, Harrison R, Burr J, Willson DF, Nicholson C, Bell MJ, Berg RA, Shanley TP, Heidemann SM, Dalton H, Jenkins TL, Doctor A, Webster A, Tamburro RF; Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) Collaborative Pediatric Critical Care Research Network (CPCCRN). Interaction between 2 nutraceutical treatments and host immune status in the Pediatric Critical Illness Stress-Induced Immune Suppression comparative effectiveness trial. *J Parenter Enteral Nutr.* 41(8): 1325-1335, 2017. PMID: 27660289.
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18. **Anand KJS**. Revisiting a dilemma: repetitive pain vs. opioid exposures? *Acta Paediatrica* 105(7): 736-7, 2016. doi: 10.1111/apa.13442. PMID: 27272629.
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21. Dong CE, Rovnaghi CR, **Anand KJS**. Ketamine exposure during embryogenesis inhibits cellular proliferation in rat fetal cortical neurogenic regions. *Acta Anaesthesiologica Scandinavica* 60 (5): 579-587, 2016. doi: 10.1111/aas.12689. PMID: 26822861.

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7. Established a new journal "*Frontiers in Pediatric Critical Care*", as part of the Nature Publishing Group in association with 24 Associate Editors and 107 Review Editors.
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93. Stroud MH, Fiser RT, Moss MM, **Anand KJS**. Near-continuous, noninvasive blood pressure monitoring during pediatric transport. American Academy of Pediatrics, National Convention & Exhibition, October 8-12, 2006. **Received AAP Young Investigator's Award from Section of Critical Care Medicine.**
94. Stroud MH, Fiser RT, **Anand KJS**. Importance of noninvasive blood pressure monitoring during pediatric transport. Abstract presented at the UAMS College of Medicine Fellow's Day, May 16<sup>th</sup>, 2006. **Received 1st Prize for the Best Fellow's Day Presentation.**
95. Bhutta AT, **Anand KJS**, Schmitz ML, Lindquist D. Ketamine as a neuroprotective agent in children undergoing cardiac surgery: Results of Magnetic Resonance Spectroscopy- Presented as poster presentation at 11<sup>th</sup> Annual Update on Pediatric Cardiovascular Disease, Feb 6-10, 2007; Scottsdale, AZ.
96. Stroud MH, Fiser RT, Prodhan P, Moss M, **Anand KJS**. Near-Continuous Blood Pressure (BP) Monitoring during Transport Improves Outcomes in P.I.C.U. Patients: A Randomized Controlled Trial. Abstract presented at the Pediatric Academic Societies' Annual Meeting, Toronto, Canada, May 5-8, 2007. **Fellows' Clinical Research Award, SPR.**
97. Bhutta AT, Rovnaghi CR, **Anand KJS**. Use of low dose Ketamine: Effect on neuronal activation and neuronal degeneration in neonatal rats. Poster presentation at the 5<sup>th</sup> World Congress on Pediatric Critical Care, June 24-28, 2007; Geneva, Switzerland.
98. Zhang LL, Rovnaghi CR, **Anand KJS**. Acupuncture reduces inflammatory hyperalgesia in newborn rats. Poster presentation at the 5<sup>th</sup> World Congress on Pediatric Critical Care, June 24-28, 2007; Geneva, Switzerland.
99. Zhang LL, Rovnaghi CR, **Anand KJS**. Acupuncture reduces brain cell death following neonatal inflammatory pain. Oral presentation at the 5<sup>th</sup> World Congress on Pediatric Critical Care, June 24-28, 2007; Geneva, Switzerland.
100. Rovnaghi CR, Venkatesan AK, **Anand KJS**. Neonatal pain alters adult cognitive performance & brain cytokine expression. Poster presentation at the 5<sup>th</sup> World Congress on Pediatric Critical Care, June 24-28, 2007; Geneva, Switzerland.
101. Hall RW, Rovnaghi CR, **Anand KJS**. Ketamine normalizes the neuroexcitatory response and decreases cell death after inflammatory pain in the amygdaloid region of the rat model. Oral presentation at the 5<sup>th</sup> World Congress on Pediatric Critical Care, June 24-28, 2007; Geneva, Switzerland.
102. Lantz SM, Frank JC, Bratton GN, Palmer SH, Rovnaghi CR, **Anand KJS**, Clancy B. Behavioral effects of Ketamine at birth are evident at late adulthood. Annual Meeting, Arkansas Chapter of the Society for Neuroscience, October 23, 2007.
103. Brown RC, Venkatesan AK, Rovnaghi CR, Hall, RW, **Anand KJS**. Behavioral Effects of Ketamine at Birth are Evident at Late Adulthood. Neurosci Abstr (2007)
104. **Anand KJS**. Exposure to neonatal pain may set the life-span patterns of pain processing. Canadian Pain Society Conference: "Pain Through The Ages - Common Themes", May 27-30, 2008, Victoria (BC), Canada.
105. Bhutta AT, Schmitz ML, James LP, Jaquiss RDB, Imamura M, Lindquist D, Glasier C, Wardbegnoche W, **Anand KJS**. Ketamine as a neuroprotective agent for children undergoing cardiac surgery: Results of a pilot randomized controlled trial. Platform presentation at Society of Pediatric Research/Pediatric Academic Societies Annual

- Meeting, May 2-6, 2008, Honolulu, Hawaii.
106. McJunkins A, Green A, Anand KJS. Pain Assessment in Cognitively Impaired, Functionally Impaired Children (PACIFIC): A Pilot Study. Presented at Society of Pediatric Nurses Annual Convention in Denver, CO April 2008. Also presented at UAMS Research Day, Little Rock, AR, April 2008.
  107. McJunkins A, Green A, Anand KJS. Pain Assessment in Cognitively Impaired, Functionally Impaired Children (PACIFIC): A randomized comparison of two pain assessment tools. Presented at Society of Pediatric Nurses Annual Convention in Atlanta, GA, April 2009, also presented at UAMS Research Day, April 2009.
  108. Mehta P, Anand KJS, Bhutta AT, McCracken A. Does exposure to opioids in the early infancy lead to long-term opioid tolerance? Results of a Case-Control Study. 2009 National Conference and Exhibition, American Academy of Pediatrics.
  109. Dong C, Rovnaghi CR, Anand KJS. Repetitive Pain and Ketamine Analgesia activate Inflammatory Mediators in the Newborn Brain. Presented at the 8th International Symposium on Pediatric Pain, International Association for the Study of Pain, March 10-13, 2010 in Acapulco, Mexico.
  110. Dong C, Rovnaghi CR, Anand KJS. Ketamine damages the proliferation of Neural Stem/Progenitor Cells (NSPCs). Presented at the 8th International Symposium on Pediatric Pain, International Association for the Study of Pain, March 10-13, 2010 in Acapulco, Mexico.
  111. Shappley RKH, Bardhan B, Ingram K, Storgion SA, Arnold SR, Anand KJS, Shah SH. Determinants of Pediatric Intensive Care Unit (PICU) Length of Stay (LOS) in Children with H1N1 Influenza A Infection. PAS Annual Meeting, Vancouver (BC), May 2010.
  112. Millfors P, Anand KJS, Bergqvist LL. Effects of paracetamol during first days of life. Poster presentation at the 16<sup>th</sup> World Congress of Basic and Clinical Pharmacology, WorldPharma2010 "*Bridging Basic and Clinical Pharmacology*", July 17-23, Copenhagen, Denmark.
  113. Dong C, Rovnaghi CR, Anand KJS. Ketamine exposure alters the fate of cortical neural stem progenitor cells (NSPCs) isolated from the embryonic rat brain. Pediatric Academic Societies and Asian Society for Pediatric Research Joint Meeting, PAS Poster Presentation, Denver, CO., April 30 - May 3, 2011.
  114. Shah SH, Scwingshackl A, Figueroa M, Knott-Craig CJ, Anand KJS. Development of a post pediatric cardiac surgery cardiac arrest (ppcs-ca) management flow process pathway. Poster presentation, Pediatric Academic Societies PAS, Denver, CO., April 30 - May 3, 2011.
  115. Sepanski RJ, Brinkley K, Summerall C, Giles K, Storgion SA, Anand KJS. Race/ethnicity associated with increased mortality among Pediatric Intensive Care Unit (PICU) patients. Pediatric Academic Societies and Asian Society for Pediatric Research Joint Meeting, PAS Platform Presentation, Denver, CO., April 30 - May 3, 2011.
  116. Dukes KM, Bobo KS, Anand KJS. Evaluation of Weaning Methadone and Lorazepam in Pediatric Patients. Presented at the 19<sup>th</sup> Pediatric Pharmacy Conference and 2010 Annual Meeting, Pediatric Pharmacy Advisory Group, October 7-10, 2010; Saint Charles, MO.
  117. Anand KJS. Development of the pain in the fetus and neonate. Platform presentation, 48th Annual Meeting of the Japanese Society of Perinatal & Neonatal Medicine; Saitama, Japan on July 8 - 10, 2012.
  118. Anand KJS. Management of pain in the neonate: current practice and novel options.



- Platform presentation, 48th Annual Meeting of the Japanese Society of Perinatal & Neonatal Medicine; Saitama, Japan on July 8 - 10, 2012.
119. **Anand KJS**. Love, Pain, and Intensive Care. Workshop presentation, 48th Annual Meeting of the Japanese Society of Perinatal & Neonatal Medicine; Saitama, Japan on July 8 - 10, 2012.
  120. Dong C, **Anand KJS**. No functional NMDA receptor determines the resistance of neural stem progenitor cells to ketamine-induced cell death. Poster presentation, Annual Meeting of the Society for Critical Care Medicine, Puerto Rico, January 27-31, 2013.
  121. Millfors P, Bai L, **Anand KJS**, Bergqvist LL. Effects of paracetamol during first days of life. Poster presentation, 9<sup>th</sup> International Symposium on Pediatric Pain, Stockholm June 17-20, 2013.
  122. Sundell I, Carbajal R, **Anand KJS**, Eriksson M. National guidelines for neonatal pain management – occurrence and content. Poster presentation, 9<sup>th</sup> International Symposium on Pediatric Pain, Stockholm June 17-20, 2013.
  123. **Anand KJS**, Hall RW, Grunau RVE, Tibboel D. Opioid therapy in neonates: Long-term effects & functional outcomes. Workshop presentation, 9<sup>th</sup> International Symposium on Pediatric Pain, Stockholm, Sweden; June 17-21, 2013.
  124. **Anand KJS**. Pain in Infancy: From Stress to Society. 9th Annual “In Praise of Medicine” Public Address, Erasmus University MC, Sophia Children’s Hospital, Rotterdam, The Netherlands, October 4, 2013.
  125. Bardhan B, Meduri G, Rovnaghi CR, **Anand KJS**. Methylprednisolone infusion in pediatric Acute Lung Injury (ALI/ARDS): Interim results from a double-blind, placebo-controlled randomized trial. SCCM poster #974, Jan. 19-23, 2013; San Juan, Puerto Rico.
  126. Shah SH, Hannah D, Pickard S, May W, **Anand KJS**. Clinical risk factors for central line associated venous thrombosis (CLAVT) in children. Poster presentation, Pediatric Academic Societies’ Meeting, Washington DC, May 3-7, 2013.
  127. **Anand KJS**, Rovnaghi CR, McPherson KD, Moore AP, Tylavsky FA. Maternal traumatic life events but not parenting stress regulate hair cortisol levels in early childhood. Platform presentation, Pediatric Academic Societies’ Meeting, Washington DC, May 3-7, 2013.
  128. Boni Y, Rovnaghi CR, **Anand KJS**. Racial Differences in salivary levels of IL-2 and cortisol: Candidate biomarkers for detection of HPA axis changes in the developing brain. 2015 Annual Biomedical Research Conference for Minority Students (ABRCMS), November 11-14 2015, Washington State Convention Center, Seattle, WA.
  129. Kimura D, Saravia JS, Rovnaghi C, Schwingshackl A, Meduri G, Cormier SA, Anand KJS. 669: The Effect of Low Dose Methylprednisolone on Biomarker Levels in Early Pediatric ARDS. Critical Care Medicine. 2015; 43 (12 Suppl 1):169. doi: 10.1097/01.ccm.0000474497.21863.8a. PubMed PMID: 26570330.
  130. **Anand KJS**, Slominki R, Boni Y, Zheng A, Rovnaghi C. 502: Magnetoencephalography scanning alters salivary cortisol, ACTH, and S100beta in pre-school children. Critical Care Medicine. 2015; 43(12 Suppl 1):127. doi: 10.1097/01.ccm.0000474330.20558.0f. PubMed PMID: 26570163.
  131. Kimura D, Rovnaghi CR, Drago BB, Meduri U, **Anand KJS**, Schwingshackl A. Differential regulation of inflammatory biomarkers by methylprednisolone in early pediatric ARDS. Critical Care Medicine. 2016; 46 (Suppl 1):183.
  132. **Anand KJS**, Cochrane JR, Cutts T, Gunderson G. Changing Health Care: From pathology to generativity; Workshop on ‘*The Leading Causes of Life*’, 14<sup>th</sup> International Conference



- on Communication, Medicine, and Ethics (COMET), Aalborg University, Denmark, July 4-6, 2016.
133. Carbajal R, Courtois E, Eriksson M, Boyle E, Avila-Alvarez A, Andersen RD, Sarafidis K, Polkki T, Matos C, Lago P, Papadouri T, Montalto SA, Ilmoja ML, Simons S, Tameliene R, van Overmeire B, Berger A, Dobrzanska A, Schroth M, Bergqvist L, Lagercrantz H, **Anand KJS** on behalf of the EUROPAIN Survey Working Group. Pain assessment in ventilated and non-ventilated neonates in NICUS across Europe: Results from the EUROPAIN study. Presented at the 16<sup>th</sup> World Congress on Pain, International Association for the Study of Pain (IASP), September 26-30, 2016, Yokohama, Japan.
  134. Amuzie GO, Rigdon J, Qin FF, Rovnaghi CR, **Anand KJS**. Development of the Family Poverty Index (FPI): a novel index to measure socioeconomic status. Presented at the 12<sup>th</sup> Annual Symposium for STEP-UP HS program, supported by National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), National Institutes of Health, Grant number: 2R25DK078382-12; August 6-10, 2017, Bethesda, MD.
  135. Rubio A, Rovnaghi CR, **Anand KJS**. What are normal cortisol values for young children? Presented at the 12<sup>th</sup> Annual Symposium for STEP-UP HS program, supported by National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), National Institutes of Health, Grant number: 2R25DK078382-12; August 6-10, 2017, Bethesda, MD.
  136. Krasinska KM, Rovnaghi CR, Anand KJS, Chien A. Quantitative LC-MS/MS analysis of cortisol and cortisone in children's hair. Comparison with cortisol ELISA assay. American Society of Mass Spectrometry, June 2018 San Diego, CA.

### **Editorial Activities**

#### **1. *Ad Hoc* Manuscript Reviewer:**

Acta Paediatrica	JAMA
Anesthesiology	JAMA Pediatrics
Archives of Disease in Childhood	Journal of Pain
American Journal of Public Health	Journal of Pediatrics
Biology of the Neonate	Journal of Perinatology
Brain Research	Lab Animal (Nature)
British Medical Journal	New England Journal of Medicine
Clinical Investigation	Pain
Clinical Journal of Pain	Pediatrics
Critical Care Medicine	Pediatric Critical Care Medicine
European Journal of Pediatrics	Pediatric Pulmonology
Epidemiology	Pediatric Research
Frontiers in Pediatrics	The Lancet

2. Appointed as Specialty Chief Editor for "***Frontiers in Pediatric Critical Care***", a section of ***Frontiers in Pediatrics***, Nature Publishing Group; has appointed 24 Associate Editors and 107 Review Editors.

#### **3. Member of the Editorial Boards of:**

Frontiers in Pediatrics (2012 – present)

Frontiers in Pediatric Critical Care (Editor-in-Chief, 2013 – present)  
 Pain (2005-2015)  
 Critical Care Medicine (2002-2012)  
 Pediatric and Neonatal Anesthesia [www.anesthesiapediatrica.it](http://www.anesthesiapediatrica.it) (2004-2012)  
 Pediatric Critical Care Medicine (2005-2009)  
 The Suffering Child ([www.thesufferingchild.net](http://www.thesufferingchild.net)) (2002-2004)  
 Biology of the Neonate (2002-2004)  
 Indian Journal of Critical Care Medicine (2003-2005)

### **Grant Reviewer**

#### **1. National Institutes of Health:**

- National Institute for General Medical Sciences (NIGMS), Surgery, Anesthesiology & Trauma Study Section (*ad hoc* reviewer, 1989).
- National Institute for Child Health and Human Development (NICHD), Maternal & Child Health Study Section-A (*ad hoc* reviewer, 1992).
- National Institute for Child Health and Human Development (NICHD), Maternal & Child Health Study Section-B (*ad hoc* reviewer, 1997).
- National Institute for Child Health and Human Development (NICHD), Small Grants Program (R03) on Health Services Research (Member, 2001).
- National Institute for Child Health and Human Development (NICHD), Pediatric Pharmacology Research Study Section (ZHD1 DSR-A-01), (October, 2003).
- National Institute for Child Health and Human Development (NICHD), Member of the Child Health & Human Development-A Pediatrics Study Section (ZHD1 CHHD-A-01), (October, 2003).
- National Institute for Child Health and Human Development (NICHD), Loan Repayment Program, applications (ZHD1 DSR-A LRP Study Section) (April, 2004)
- National Institute for Child Health and Human Development (NICHD), *ad hoc* reviewer (K12 Grant awards for Critical Care Medicine, May, 2004)
- National Institute for Child Health and Human Development (NICHD), (ZHD1 DSR-A Loan Repayment Program Study Section) (Member, 2005)
- National Institute for Mental Health (NIMH), NIH Roadmap Initiative: review of Interdisciplinary Training Grant applications (July, 2005)
- National Institute for Child Health and Human Development, Special Emphasis Panel for the NICHD Neonatal Network (November, 2005)
- National Institute for Child Health and Human Development (NICHD), Pediatrics Sub-Committee (CHHD-A) (October, 2005)
- National Institute for Child Health and Human Development (NICHD), ZHD1 DSR-A Loan Repayment Program Committee (March-April, 2006)
- National Heart, Lung and Blood Institute (NHLBI), Clinical Studies and Training Scientific Review Group (CLTR Study Section, June, 2006)
- Center for Scientific Review, National Institutes of Health, BBBP - Biobehavioral & Behavioral Processes IRG, Child Psychopathology & Developmental Disabilities (CPDD) Study Section; Ad hoc Reviewer (June, 2006)
- National Center for Research Resources (NCRR), ZRR1 CR-3 (01), Loan Repayment

Program Committee (March-April, 2007)

- National Institute of Neurological Disorders and Stroke (NINDS), ZNS1 SRB-M-948 (01), Loan Repayment Program Committee (April, 2007)
- National Institute of Neurological Disorders and Stroke (NINDS), Special Emphasis Panel ZNS1 SRB-M (75), April 2010.
- Center for Scientific Review (CSR), NIH Study Section ZRG1 SBIB-V (82), National Institutes of Health, October 2014.
- Member, Special Emphasis Panel, STTR applications for RFA: “Safe and Effective Instruments and Devices for Use in Neonatal and Pediatric Care Settings (R41/R42)” and “Non- or Minimally-Invasive Methods to Measure Biochemical Substances for Neonatal and Perinatal Clinical Care and Research (R41)”, October 2015.
- Member, *Eunice Kennedy Shriver* National Institute of Child Health & Human Development (NICHD/NIH), Special Emphasis Panel/Scientific Review Group 2016/01 ZHD1 DSR-K (90), March 2016.
- *Ad hoc* Member, Center for Scientific Review 2016/10 ZRG1 PSE-D (90), Neurological, Aging & Musculoskeletal Epidemiology (NAME) Study Section, June 2016.
- Member, Center for Scientific Review SBIB H (82), Clinical Fetal & Pediatric Applications Study Section, February 2017.
- Member, Center for Scientific Review SBIB H (82), Clinical Fetal & Pediatric Applications Study Section, October 2017.

## 2. National Science Foundation:

- Directorate for Social, Behavioral, and Economic Sciences, Division of Behavioral and Cognitive Sciences (Neuroendocrinology Study Section, *ad hoc* Reviewer, 2004, 2012).

## 3. Non-Federal and Foreign National Agencies:

- Medical Research Council of Canada (1987, 1991)
- The Wellcome Trust, United Kingdom (1996, 1999, 2001, 2004)
- Hospital for Sick Children Foundation, Toronto, Canada (1995, 1997)
- Career Scientist Development Program, Ministry of Health, Canada (1996, 1998)
- Austrian Federal Ministry of Education, Science and Culture (Division of Life Sciences) (2002)
- Dutch Organization for Scientific Research, The Netherlands (1995, 2001)
- The Blowitz-Ridgeway Foundation, “Neuroscience Grants” (2001, 2002, 2004)
- Society of Critical Care Medicine, “Patient Safety Grants” (2003, 2004)
- Swiss National Science Foundation, Division of Biology and Medicine, Bern, Switzerland: “Stress Neurobiology Grants” (2003)
- Society of Critical Care Medicine, Vision Grants Review (2005, 2006, 2007)
- German Ministry of Health, German Aerospace Center Department of Health Research, Long-term Studies in Health Research (September 2007).
- Spanish Ministry of Health and Consumer's Affairs, Invited grant evaluator for the National Programme of Cooperative Research (March, 2008)

## Peer Reviews

1. **External Reviewer, Faculty Promotion Committees:**

- **Dr. Ruth V.E. Grunau** for Assistant Professor, Department of Pediatrics, University of British Columbia, Vancouver BC, Canada.
- **Dr. Joseph D. Tobias** for Associate Professor with Tenure, University of Missouri, Columbia, Missouri.
- **Dr. Patricia A. McGrath** for Professor with Tenure, University of Western Ontario, London, Ontario, Canada.
- **Dr. Bonnie Stevens** for Associate Professor with Tenure, University of Toronto, Toronto, Ontario, Canada.
- **Dr. Steven J. Weisman** for Professor of Anesthesiology, Medical College of Wisconsin, Milwaukee, Wisconsin.
- **Dr. Linda S. Franck** for Associate Professor, Department of Family Health Care Nursing, School of Nursing, University of California, San Francisco, CA.
- **Dr. Myron Yaster** for Tenured Professor, Department of Anesthesiology and Critical Care Medicine, Johns Hopkins University School of Medicine, Baltimore, MD.
- **Dr. G. Allen Finley** for Full Professor with tenure, Department of Anesthesiology, Dalhousie University, Halifax, Nova Scotia, Canada.
- **Dr. William Zempsky** for Associate Professor, Department of Pediatrics, University of Connecticut Health Center, Farmington, CT.
- **Dr. Santhanam Suresh** for Associate Professor in the Department of Anesthesiology, Feinberg School of Medicine, Northwestern University, Chicago, IL.
- **Dr. Marianne Garland** for Associate Professor in the Department of Pediatrics, Columbia University College of Physicians and Surgeons, New York, NY.
- **Dr. Natan Noviski** for Associate Professor, Department of Pediatrics, Harvard Medical School and MassGeneral Hospital for Children, Boston, MA.
- **Dr. Ruth Grunau** for Professor, Department of Pediatrics, University of British Columbia, Vancouver BC, Canada.
- **Dr. Michael Agus** for Associate Professor, Department of Anesthesiology & Critical Care Medicine, Harvard Medical School, Children's Hospital, Boston, MA.
- **Dr. Michael Bell** for Professor, Department of Critical Care Medicine, University of Pittsburgh, UPMC Children's Hospital of Pittsburgh, Pittsburgh, PA.
- **Dr. I. Federico Fernandez-Nievas** for Assistant Professor, University of Cleveland, Cleveland Clinic, Cleveland, OH.
- **Dr. Emilie Courtois**, Member of l'Académie des Sciences, Bourses françaises L'Oréal-UNESCO Pour les Femmes et la Science, Paris, France.
- **Dr. Umesh Narsinghani** for Professor, Department of Pediatrics, Mercer University School of Medicine, Macon, GA.
- **Dr. Andreas Schwingshackl** for Associate Professor In-Residence, Department of Pediatrics, David A. Geffen School of Medicine, University of California Los Angeles, Los Angeles, CA.
- **Dr. Jason Custer** for promotion to Associate Professor (non-tenure track), Department of Pediatrics, University of Maryland, Baltimore, MD.
- **Professor Ricardo Carbajal** for promotion to Professor and Chair, Division of General Pediatrics, University Hospital of Geneva, Geneva, Switzerland.

2. **Scientific Reviewer for:**

Kanwaljeet S. Anand

CURRICULUM VITAE

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- ◆ 3<sup>rd</sup> International Meeting of Pediatric Intensive Care, June 1993, Padova, Italy.
  - ◆ Conference on Pediatric Pain: Challenges, Innovations, and Costs, Emory University School of medicine and Egleston Children's Hospital, Atlanta GA, November 1995.
  - ◆ 2<sup>nd</sup> World Congress on Pediatric Intensive Care, June 1996, Rotterdam, The Netherlands.
  - ◆ 4<sup>th</sup> International Symposium on Pediatric Pain, July 1997, International Association for the Study of Pain, Helsinki, Finland.
  - ◆ 3<sup>rd</sup> World Congress on Neonatal and Pediatric Intensive Care, June 2000, Montreal, Canada.
  - ◆ 2005 Pediatric Academic Societies' (SPR/APS/APA/AAP) Annual Meeting, May 2005, Baltimore, MD.
  - ◆ 5<sup>th</sup> International Symposium on Pediatric Pain, March 2010, International Association for the Study of Pain, Acapulco, Mexico.
  - ◆ Workshop Reviewer, Pediatric Academic Societies' Annual Meeting, May 2012, Boston, MA.
  - ◆ Workshop & Abstract Reviewer, Pediatric Academic Societies' Meeting, May 2013, Washington DC.
  - ◆ Workshop & Abstract Reviewer, Pediatric Academic Societies' Meeting, May 2014, Vancouver, BC (Canada).
  - ◆ Workshop & Abstract Reviewer, Pediatric Academic Societies' Meeting, April-May 2015, San Diego, CA.
  - ◆ Workshop Proposal Reviewer, Pediatric Academic Societies' Meeting, May 2015, Baltimore, MD.
3. Member, Promotions & Tenure Committee, Department of Pediatrics, University of Tennessee Health Science Center (2009-2015) and Chair, Promotions & Tenure Committee, Department of Pediatrics, University of Tennessee Health Science Center, 2013

### **Academic Leadership Activities:**

1. Moderator, Symposium on "Pain and Stress Responses in Children": for the 1<sup>st</sup> World Congress of Pediatric Intensive Care, June 1992, Baltimore MD, U.S.A.
2. Moderator, Symposium on "Pain Control in the Intensive Care Nursery": Special Ross Conference on "Hot Topics in Neonatology 1992", December 1992, Washington DC, U.S.A.
3. Moderator, Symposium on "Analgesia and Sedation in the Pediatric I.C.U.": The 3<sup>rd</sup> International Meeting on Pediatric Intensive Care, June 1993, Padova, Italy
4. Chairman, "Neonatal Outcome and Prolonged Analgesia in Newborn ICUs": Protocol Discussion Meeting for the NOPAIN Trial, held in conjunction with "Hot Topics in Neonatology 1993" December 1993, Washington DC, U.S.A.
5. Organizer and Co-Chairman, National Institute of Child Health and Human Development Symposium on "Neonatal Pain: Physiology and Management", supported by the NICHD Center for Research for Mothers and Children, June 1994, Philadelphia PA, U.S.A.
6. Moderator for a Workshop on "Pain during Critical Illness: Management Principles", 3<sup>rd</sup> International Symposium on Pediatric Pain, IASP Special Interest Group on Pain in Children, June 1994, Philadelphia PA, U.S.A.



7. Course Director, International Symposium on “Pain in Infants: Assessment and Management” Emory University School of Medicine and Egleston Children’s Hospital, October 20, 1994, Atlanta GA, U.S.A.
8. Moderator, Symposium on Maternal and Newborn Health “Pain in Newborns: Revolutionary impact on N.I.C.U. care”, CHILD HEALTH 2000: Second World Congress & Exposition, May 30 - June 3, 1995, Vancouver (B.C.), Canada.
9. Course Director, “Pediatric Pain: Challenges, Innovations and Costs” Emory University School of Medicine and Egleston Children’s Hospital, November 4, 1995, Atlanta GA, U.S.A.
10. Moderator, Symposium on “Intensivists as Change Agents”, in Survival Strategy for Pediatric Intensivists under Managed Care, Egleston Children’s Health Care System and Emory University, March 14-15, 1996, Atlanta GA, U.S.A.
11. Chairman, Committee on Pain in Newborns and Infants, Project funded by the Maternal and Child Health Bureau, Department of Health & Human Services, U.S. Government, 1996-98.
12. Moderator, Poster Symposium on Analgesia and Sedation in the Pediatric I.C.U., 2<sup>nd</sup> World Congress on Pediatric Intensive Care, Rotterdam, The Netherlands, June 23-26, 1996.
13. Presented a proposal to the Site Selection Committee for getting the 3<sup>rd</sup> World Congress of Pediatric Intensive Care to Atlanta in July 2000.
14. Fourth International Pediatric Pain Symposium, Special Interest Group on Pediatric Pain, International Association for the Study of Pain, July 1-4, 1997, Helsinki, Finland.  
Chairperson, Scientific Symposium 5: Clinical Pharmacology of Analgesics in Children.
15. Chairman, International Consensus Conference on “Pain and Pain Management during Infancy”, Nice, France, April 21-23, 1998.
16. Co-Chairman, Symposium on “Pain Management in Neonatal and Pediatric Intensive Care”, 9<sup>th</sup> Annual Meeting, European Society of Pediatric Intensive Care, Stockholm, Sweden, September 6-9, 1998.
17. Moderator, Symposium on “Philosophical and Scientific Bases for the Definition of Pain”, 17<sup>th</sup> Annual Scientific Meeting, American Pain Society, San Diego, CA, November 5-8, 1998.
18. Chairman, International Consensus Conference on “Pain Management Guidelines for Infant”, Baden-Baden, Austria, August 20-21, 1999.
19. Moderator, Session on “Pharmacological Management”, 27<sup>th</sup> Neonatal & Infant Symposium, University of California at Irvine, College of Medicine, Vail, Colorado; March 19-23, 2000.
20. Chairman, Pharmacology, Pain & Sedation Track, at the 3<sup>rd</sup> World Congress on Pediatric Intensive Care, Montreal, Canada, June 24-29, 2000.
21. Moderator of the Plenary Session, Pharmacology, Pain & Sedation Track, 3<sup>rd</sup> World Congress on Pediatric Intensive Care, Montreal, Canada, June 24-29, 2000.
22. Chairman, State-of-the-Art Plenary Session on Pediatric Pain, PAS 2002 Meeting, Baltimore MD, May 3-7, 2002.
23. Chairman, Plenary Session on Pain, 18<sup>th</sup> European Congress of Perinatal Medicine, June 19 – 22, 2002; Oslo, Norway.
24. Chairman, Plenary Session, 8<sup>th</sup> Biennial Congress, European Society for Developmental Pharmacology (ESDP), October 27<sup>th</sup>, 2002; Liège, Belgium.
25. Chairman, Pharmacology, Analgesia & Sedation Track, 4<sup>th</sup> World Congress on Pediatric Intensive Care, Boston MA, June 16-20, 2003.
26. Chairman, NICHD/FDA Task Force for Neonatal Anesthesia, Analgesia and Sedation, Newborn Drug Development Initiative from the Best Pharmaceuticals for Children Act, February 10<sup>th</sup>, 2003.

27. Expert Witness for the U.S. Department of Justice, defendants of the Partial Birth Abortion Ban Act of 2003. Provided expert testimony on the development of fetal pain in the Supreme Courts for the District of Nebraska, Southern District of New York, and Northern District of California.
28. Chairman, Neonatal Pain Control Working Group, Newborn Drug Development Initiative Workshop, March 29<sup>th</sup> and 30<sup>th</sup>, 2004; Baltimore, MD.
29. Research Competition Judge, 11<sup>th</sup> Annual Residents' Day, Department of Anesthesiology, University of Arkansas for Medical Sciences, February 12<sup>th</sup>, 2005; Little Rock, AR.
30. Moderator for the Brain Injury Poster Symposium Session, Saturday, PAS Annual Meetings, Washington DC, May 14<sup>th</sup>, 2005.
31. Chairman, 11th World Congress on Pain held in Sydney, Australia, workshop on "Impact of Neonatal Pain on Subsequent Pain Processing, Pain Thresholds and Responses to Analgesia".
32. Hosted a meeting of the NIMH-funded Maternal-Fetal Network (Impact of Adverse Fetal and Neonatal Experience on Child and Adolescent Mental Health, "Salient Environmental Signals and Learning Systems: the LHPA Axis") in Little Rock, October 5-7, 2006.
33. 36<sup>th</sup> SCCM Critical Care Congress, Orlando, FL; February 17-21, 2007; Chaired the Annual Meeting of the SCCM Research Committee.
34. Social Issues Roundtable, Society for Neuroscience Meeting, San Diego CA, November 11-16, 2007. Multi-disciplinary discussion on: "Can the Neuroscience of Fetal Pain and Human Consciousness inform Social Issues, Current Policies or Pending Legislation?"
35. Moderator, *Neonatal Clinical Trials: Nutrition, Development and Pulmonary Outcomes*, PAS Original Science Abstracts - Platform Session, Saturday, 5/4/2013; Washington Convention Center, Washington DC.
36. Chairman, *Community, Family, Health and Genetics: Risk Factors for Socio-emotional Development in Urban Children*, PAS Topic Symposium; Monday, 5/6/2013; Washington Convention Center, Washington DC.
37. Chairman, Workshop on *Opioid Therapy in Neonates: Long-term Effects & Functional Outcomes*, 9<sup>th</sup> International Symposium on Pediatric Pain, Stockholm, Sweden; June 17-21, 2013.

(Dr. Anand has continued to play leadership roles in various national and international meetings since June 2013, but stopped recording these roles since they were too numerous to count and were offered due to his preeminence in the fields of neonatal pain and pediatric critical care.)

#### **National Research Committees:**

- Data & Safety Monitoring Committee, NIH Grant to University of Pittsburgh (clinical trial of hypothermia for critically ill children with head trauma - NINDS): 1999-2003
- Consultant, G. D. Searle & Co., Planning Committee for Pediatric Trials of COX-2 Inhibitors: 2000-2002
- Consultant, The Vermont-Oxford NICU Network, NIC/Q 2002 Collaborative: 2002-2003
- Research Committee, Society of Critical Care Medicine: 2003-2006; Vice Chair: 2005-2006; Chairman: 2006-2007.
- NICHD/FDA (National Institute of Child Health and Human Development / Food and Drug Administration, Center for Drug Evaluation and Research) Newborn Drug Development Initiative, Member of the National Planning Group 2003-2004

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- NICHD/FDA Newborn Drug Development Initiative, Chairman of the Neonatal Pain Control Working Group: 2003-2005
- Data Safety and Monitoring Board for an NHLBI-supported program "Re-engineering Clinical Research in Critical Care" 2005-2008.

**COMMITTEE APPOINTMENTS:**

**Stanford University School of Medicine**

- Division Chiefs Committee, Department of Pediatrics, Stanford University (2015-2016)
- Search Committee for Director, Non-invasive Cardiac Imaging Lab, Department of Pediatrics and Lucile Packard Children's Hospital (2016-2017)

**Lucile Packard Children's Hospital Stanford**

- Service Chiefs Committee (2015-2017)
- Medical Executive Committee (2015-2016)
- Medical Director, Pediatric Intensive Care Unit (June-November, 2016)
- PICU Governance Committee (2015-2016)
- Quality Improvement Council (2015-2016)
- Clinical Improvement Committee (2015-2016)
- Pediatric I.C.U. Local Improvement Team (LIT) Committee (2015-2016)
- Critical Care Daily Management Oversight Committee (2015-2016)
- Packard 2.0-Growing Together: Operations & Transition Planning Committee (2015-2016)

**International Association for the Study of Pain:**

Selection Committee for the "Young Investigator Award in Pediatric Pain": 2011, 2014, 2017  
Member of the Governing Council, Special Interest Group for Pediatric Pain (2010-2017)  
Chair, Selection Committee for the "Distinguished Investigator Award in Pediatric Pain",  
International Association for the Study of Pain: 2011, 2013, 2015

**Society for Critical Care Medicine**

Research Committee: Member (2001-2006), Vice-Chair (2006-2007), Chair (2007-2008)  
SCCM Research Foundation, Board Member (2009-2014)

**Previous Committee Appointments:**

***Egleston Children's Hospital at Emory University:***

Pediatric Intensive Care Unit Committee: 1993-1997

Care Pathways Task Force: 1994-1996.

Asthma Care Pathway Development Task Force: 1994-95

Nursing Research Council, Pediatric I.C.U.: 1994-1997

Bereavement Council, Pediatric I.C.U.: 1995-1997

Re-engineering of Intensive Care Services: Aug 1995 - June 1996

Chairman, Research Office Development Task Force: 1996

***Department of Pediatrics, Emory University School of Medicine:***

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Departmental Executive Committee: 1995-96

Division Director's Committee: 1995-96

Goddard Faculty Scholar Selection Committee: 1995

Long-Term Research Planning Committee: 1995-96

***Emory University School of Medicine:***

Planning Committee, Problem-Based Learning Course: 1995-96

Committee for the Care and Use of Fetal and Newborn Animals: 1995

***U.A.M.S. College of Medicine:***

- Section Heads Committee, Department of Pediatrics: 1997 to June, 2003
- Program Directors Subcommittee, Graduate Medical Education Committee: 1998 to 2003
- Search Committee for Chairman of the Anatomy Department: 1998-99
- Research Advisory Committee, General Clinical Research Center: 1999 to 2001
- College of Medicine Research Committee (Grants Review): 1999
- Summer Science Student Selection Committee, Department of Pediatrics: 2000
- Chairman, Pediatric Endocrinology Search Committee, Department of Pediatrics: 1999-2000
- Chairman, Research Strategic Planning Committee, Department of Pediatrics: 2000
- Member, GME Appeals Board, UAMS: 2002 to 2004
- Member, Genetics Senior Scientist Search Committee: 2002
- Chair, Faculty Mentoring Committees for Mark Heulitt, M.D. (1999-2001); Mohd. Ilyas, M.D. (2001-to present); R. Whit Hall, M.D. (1999-to present)
- Faculty Mentoring Committees for Craig Rowlands, Ph.D. (1999-2001); Shalini Khurana, M.D. (2003-2005), Adnan Bhutta, M.D. (2002-to present), Ritu Sachdeva, M.D. (2003-to present); Jeffrey R. Kaiser, M.D. (2001-2005); Regina Gargus, M.D., MPH (2005-to present)
- Recruitment Committee for Department of Anatomy and Neurobiology: 2002-2004
- Member, Search Committee for Chief of Pediatric Genetics & Genomics, 2004 – 2005.
- Interviewer for Department of Pediatrics Residency Program candidates, 2002, 2003, 2004.
- Member, Biostatistics Steering Committee, Department of Pediatrics 2004-2005
- CCM Fellows Scholarship Committees, Department of Pediatrics, 2004 – to present.
- Member, Developmental Biology Core Scientists Search Committee, 2005 – to present.
- Campus-wide Criterion 4 Committee, University of Arkansas for Medical Sciences: 2005
- Faculty Advisor, UAMS Graduate School of Studies: 2005
- Member, Special Ad Hoc Evaluation Committee on College-Wide Events, UAMS College of Medicine

***U.A.M.S. College of Nursing:***

- Member, Nursing Scholars Mentoring Committee
- NIH Grant Review Committee, Dr. Pao-Feng Tsai, August, 2004.

***Arkansas Children's Hospital:***

- Space Committee: 1997 to 2000
- PICU-CQI Committee: 1997 to 2006
- Multidisciplinary Mortality & Morbidity Review Committee: 1997 to 2001

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- Chairman, Task Force on Analgesia for Withdrawal of Life Support: 1998-99
- Intensive Care Committee: 1998 to 2003
- Corporate Compliance Executive Committee: 1999 to 2003
- Nitric Oxide Therapy Task Force: 2000
- Pain Management QI Team: 2000 to 2001
- Pediatric Intensive Care Unit Planning Team, 2001 to 2003

***Arkansas Children's Hospital Research Institute***

- Research Council: 1997 to 2009.
- Board of Directors: 1999 to 2008
- Chairman, Clinical Research Advisory Committee: 1999 to 2002
- Co-Chair, Faculty Research Conference, 2001 to 2009
- Vice-Chair, Search Committee for the President of ACHRI: April to Sept., 2003
- ACHRI Research Council task force: Definition of focus areas, September – December 2004.

***University of Tennessee Health Science Center:***

- Dean's Faculty Advisory Committee 2013-2015.
- Member, Promotions & Tenure Committee, Department of Pediatrics 2009-2015.
- Chair, Promotions & Tenure Committee, Department of Pediatrics, 2013
- Division Directors Committee, Department of Pediatrics 2009-2014
- Curriculum Re-design Committee: Basic Science, College of Medicine 2010-2012
- Research Committee, Children's Foundation Research Center 2009-2014
- Search Committee for the Executive Dean, College of Medicine 2011-2012
- Search Committee for the Dean, College of Pharmacy 2012-2013
- Research Development Advisory Committee, Clinical & Translational Science Institute 2009-2012

***Le Bonheur Children's Hospital:***

- Senior Leadership Council 2009-2014
- Physician Advisory Group 2010-2012
- Quality Council 2009-2013
- Hospital Ethics Committee 2009-2014
- Hospital Operations Move Committee 2009-2010
- Critical Care Safety & Quality Committee 2009-2014
- Disaster Preparedness Task Force 2010-2012
- Neuro-ICU Design Committee 2012-2013
- Pediatric Burns Task Force 2009-2012
- CLABSI Reduction Task Force 2010-2015
- CVICU Physician Leadership Committee 2009-2013
- Organ Transplant Advisory Committee 2012-2014
- Pharmacy & Therapeutics Committee 2010-2015

***St. Jude Children's Research Hospital:***

- Critical Care Committee 2009-2014



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- Tower 2 Planning Committee 2011-2013
- GME Committee, *ad hoc* consultant for simulation studies 2012-2013

***Methodist Le Bonheur Healthcare System:***

- System-wide Ethics Committee, 2011-2015
- Critical Care Study Group, 2010-2013
- Senior Fellow, Center of Excellence in Faith & Health, 2010-2013

***The Urban Child Institute:***

- Principal Investigators Steering Committee, 2009-2015

**INVITED PRESENTATIONS:**

**1983**

4<sup>th</sup> Annual Conference, National Neonatology Forum, December, 1983, Indore, India. “The stress response of neonates to surgical trauma.”

**1984**

International Symposium on Surgery and Support of the Premature Infant, September, 1984, Dublin, Ireland. “Metabolic changes following thoracotomy in preterm neonates.”

Symposium on Perspectives in Neonatology, November, 1984, Newcastle upon Tyne, UK. “The metabolic and endocrine responses of the human newborn to surgical stress.”

Nuffield Department of Surgery Seminars, University of Oxford, February, 1984, Oxford, UK. “Response of the neonate to the stimuli of surgical stress.”

Post-Graduate Lectures, Janeway Childhealth Center, Memorial University of Newfoundland, August, 1984, St. John’s, Canada. “The beneficial and harmful effects of endocrine-metabolic changes in neonates undergoing surgery.”

Department of Anaesthesia Seminars, The Brompton Hospital, November, 1984, London, UK. “The neonatal stress response to surgery: Is it a physiological or pathological phenomenon?”

Post-Graduate Seminars, Nuffield Department of Anaesthetics, University of Oxford, November, 1984, Oxford, UK. “Pathophysiology of the neonatal stress response to anaesthesia and surgery.”

**1985**

1<sup>st</sup> Joint Meeting, The Neonatal Society and British Association of Perinatal Paediatrics, July, 1985, Dundee, UK. “The endocrine and metabolic response of preterm neonates to ligation of a patent ductus arteriosus.”

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Ciba Foundation Symposium on “Pain and the Fetus” (Ciba Foundation), October, 1985, London, UK. “Does the newborn infant need anaesthesia during surgery?”

6<sup>th</sup> Annual Conference, National Neonatology Forum, November, 1985, Calcutta, India. “Total parenteral nutrition in newborn infants undergoing surgery.”

Paediatric Post-Graduate Lectures, Department of Paediatrics, University of Leicester, February, 1985, Leicester, UK. “Regulation of metabolic homeostasis in the neonatal surgical patient and its practical implications.”

Grand Rounds, Department of Anesthesia, children’s Hospital, Harvard Medical School, April, 1985, Boston, MA. “Features of the neonatal stress response to anaesthesia and surgery.”

Paediatric Cardiology Seminars, Department of Child Health, University of Newcastle upon Tyne, May, 1985, Newcastle upon Tyne, UK. “Practical management of the newborn infant undergoing cardiac surgery in relation to the body’s stress response.”

Post-Graduate Lectures, Nuffield Department of Anaesthetics, University of Oxford, November, 1985, Oxford, UK. “Randomised control trials of halothane and fentanyl anaesthesia in neonates undergoing surgery.”

Guest Lectures, Department of Paediatrics, Post-Graduate Institute for Medical Education and Research, November, 1985, Chandigarh, India. “Does the newborn infant really need anesthesia?”

Guest Lectures, Department of Surgery, Post-Graduate Institute for Medical Education and Research, November, 1985, Chandigarh, India. “Measuring the severity of surgical stress in newborn infants.”

## 1986

International Symposium on “Analgesia for Neonates”, The Association of Anaesthetists of Great Britain and Ireland, July, 1986, London, UK. “Is the stress response in the newborn different to that in the adult?”

Anesthesia Grand Rounds, Children’s Hospital, February, 1986, Boston, MA. “An overview of neonatal stress response.”

Cardiac Anesthesia Seminars, Department of Anesthesia, Massachusetts General Hospital, February, 1986, Boston, MA. “Clinical implications of the neonatal stress response.”

Paediatric Grand Rounds, Department of Child Health, University of Newcastle upon Tyne, April, 1986, Newcastle upon Tyne, UK. “Endocrine and metabolic changes in newborn infants undergoing anaesthesia and surgery.”

Surgical Grand Rounds, Department of Surgery, Children’s Hospital, May, 1986, Boston, MA.

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“Measuring the severity of surgical stress in neonates and small infants.”

Neonatology Grand Rounds, Department of Paediatrics, University of Oxford, John Radcliffe Hospital, July, 1986, Oxford, UK. “An overview of the neonatal stress responses to surgery.”

Anesthesiology Grand Rounds, Department of Anesthesiology, Tufts University, New England Medical Centre Hospitals, December 1986, Boston, MA. “Does the neonate feel pain?”

Pain Clinic Seminars, Children’s Hospital, December, 1986, Boston, MA. “Pain perception in the human newborn infant.”

### 1987

International Symposium on Paediatric Surgical and Neonatal Intensive Care, September, 1987, Paris, France. “Randomised trials of fentanyl and halothane - Is anaesthesia necessary for the human newborn infant?”

Third International Symposium on Paediatric Surgical and Neonatal Intensive Care, September, 1987, Paris, France. “Measurement of the degree of surgical stress in newborn infants by a novel scoring method.”

First Annual Conference, Society for Pediatric Anesthesia, October, 1987, Atlanta, GA. “Stress response to surgery in the newborn.”

International Symposium on ‘Opiate Receptors and Pain Management’, November, 1987, New Orleans, LA. “Effects of high-dose sufentanil anesthesia on the mortality of neonates undergoing cardiac surgery.”

Cardiology Grand Rounds, Department of Pediatrics, Children’s Hospital, January, 1987, Boston, MA. “Neonatal stress responses and their practical implications.”

Neuropathology Research Seminars, Department of Neurosciences, Harvard Medical School, January, 1987, Boston, MA. “Pain perception in the human fetus and newborn: present data and future research.”

Neonatology Seminars, Children’s Hospital, March, 1987, Boston, MA. “Pain perception and use of narcotics in preterm and term neonates.”

NICU Clinical Conference, Joint Program of Neonatology, Brigham and Women’s Hospital, March, 1987, Boston, MA. “Does the newborn baby feel pain and what can we do about it?”

Surgical Grand Rounds, Department of Surgery, Children’s Hospital, June, 1987, Boston, MA. “Fundamental statistics for medical research.”

Anesthesia Grand Rounds, Department of Anesthesia, Massachusetts General Hospital, July, 1987, Boston, MA. “Neonatal stress responses.”

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Post-Graduate Seminars, Department of Paediatrics, University of Cambridge, Addenbrooke's Hospital, August, 1987, Cambridge, UK. "Pain perception in the human newborn infant."

Joint Colloquium, Departments of Paediatrics, Surgery & Anesthesia, Christian Albrechts University of Kiel, Universitäts-Kinderklinik, September, 1987, Kiel, FRG. "Neonatal stress responses and their relation to pain."

Neonatal Grand Rounds, Department of Paediatrics, Montreal Childrens Hospital, October, 1987, Montreal, Canada. "Does the newborn baby feel pain?"

### 1988

International Symposium on 'Pain after Surgery and Trauma', May, 1988, Meran, Italy. "Postoperative pain in infants and children."

Symposium on 'Emotional & Physical Needs of the Newborn', June, 1988, London, UK. "Pain perception in preterm and term neonates."

1<sup>st</sup> International Symposium on Pediatric Pain, July, 1988, Seattle, WA.. "Pain and its effects in the human neonate."

B.P.A. Diamond Jubilee Paediatric Conference, Royal College of Physicians of London, October, 1988, London, UK. "The ontogeny of pain perception in the human fetus and neonate."

Second Annual Conference, Society for Pediatric Anesthesia, October, 1988, San Francisco, CA. "The stress response - how is the newborn different?"

Joint Conference of the American Pain Society & Canadian Pain Society, November, 1988, Toronto, Canada. "Physiological responses to pain in neonates".

Anesthesia Grand Rounds, Department of Anesthesiology and Critical Care Medicine, The Johns Hopkins Hospital, January, 1988, Baltimore, MD. "Effects of anesthesia on the neonatal stress responses."

Neonatology Grand Rounds, Department of Pediatrics, Stanford University Medical Center, January, 1988, Palo Alto, CA. "Pain perception in preterm and term neonates."

Pediatric Grand Rounds, Department of Pediatrics, The Johns Hopkins Hospital, January, 1988, Boston, MA. "Pain and stress responses in neonates."

Anesthesia Grand Rounds, Department of Anesthesia, Beth Israel Hospital, February, 1988, Boston, MA. "Randomised trial of sufentanil anesthesia in neonates undergoing cardiac surgery."

Clinical Conference, Joint Program in Neonatology, Brigham & Women's Hospital, May, 1988, Boston, MA. "Mechanisms of pain and the ontogeny of nociception in the human fetus and neonate."

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Anesthesia Grand Rounds, Department of Anesthesiology, Children's Hospital National Medical Center, George Washington University, June, 1988, Washington, DC. "Pain and stress in surgical neonates: The role of anesthesia."

Anesthesia and Surgery Combined Grand Rounds, Departments of Anesthesia and Surgery, Children's Hospital of Eastern Ontario, June, 1988. Ottawa, Canada. "Anesthetic requirements for neonates."

Anesthesia Grand Rounds, The Children's Hospital, Boston, September, 1988, Boston, MA.. "Advances in our understanding of the role of stress attenuation in the newborn."

### 1989

Annual conference, The Philadelphia Perinatal Society, January, 1989, Philadelphia, PA. Keynote Address: "Pain and its effects in the Human Neonate and Fetus."

Annual Conference, The New England Perinatal Society, February, 1989, Manchester, VT. Keynote Address: "Pain in the newborn baby."

The 1989 "Trends in NICU Nursing" Conference, April, 1989, Boston, MA. "Pain Management in the NICU".

First European Conference on Pediatric Pain, IASP & European Chapters for the Study of Pain, June, 1989, Maastricht, The Netherlands. Keynote Address: "Pain in the neonate: Myths and realities."

International symposium on "Opioids in Anesthesia II", September, 1989, Cleveland, OH. "Opioids and Outcome in Pediatric Surgery."

Fifth Annual Neonatal Symposium "Persistent Perinatal Problems", St. Elizabeth Hospital Medical Center, October, 1989, Youngstown, OH. "Ontogeny of pain perception in the human fetus and neonate".

Fifth Annual Neonatal Symposium "Persistent Perinatal Problems", St. Elizabeth Hospital Medical Center, October, 1989, Youngstown, OH. "Stress responses and their clinical implications in the fetus, preterm and term newborn".

Pediatric Grand Rounds, Department of Pediatrics, The Children's Hospital of Philadelphia, Philadelphia, March, 1989. "Can the newborn infant feel pain?"

Anesthesia Grand Rounds, Department of Anesthesia and Critical Care Medicine, The Children's Hospital of Philadelphia, Philadelphia, March, 1989. "anesthetic implications from neonatal stress responses."

Symposium on Pain, Harvard Anesthesia Center, Harvard Medical School, Boston, May, 1989. "Pain in the human neonate."



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Neonatal Symposium, St. Joseph's Health Center and Lawson Research Institute, London, Ont., Canada, September, 1989. "Metabolic and endocrine accompaniments of pain in the newborn."

Pediatric Grand Rounds, Children's Hospital of Western Ontario, London, Ont., Canada) September, 1989. "Pain in the neonate: myths and realities."

Advances in Pharmacology Seminar, Department of Pharmacology and Robert's Research Institute, University of Western Ontario, London Ont., Canada, September, 1989. "Strategies for the management of pain in the human neonate."

CME Seminars, Department of Pediatrics and Adolescent Medicine, The Lahey Clinic, Burlington (USA), November, 1989. "Pain and its management in newborns and infants."

### 1990

Conference on "Shaping the Future of Children's Health Care", 25<sup>th</sup> Annual Conference, Association for the Care of Children's Health, Washington DC, May, 1990. "Assessing and managing pain in infants".

Fourth Annual John Lind Symposium on "Pain in Children", Trollhattan, Sweden, September, 1990. Keynote Address: "The neuroanatomy, neurophysiology, and neurochemistry of pain, stress and analgesia in newborns and children."

44<sup>th</sup> Annual congress, Svensk Forening Fro Anestesi och Intensivvard, Huddinge, Sweden, September, 1990. Keynote Address: "The neuroanatomy, neurophysiology, and neurochemistry of pain, stress and analgesia in newborns and children."

Contemporary Forums Annual Conference on 'Developmental Interventions in Neonatal Care', Washington DC (USA), November, 1990. "Assessment and management of pain in the neonate."

Nursing Grand Rounds, Department of Nursing, The Children's Hospital, Boston, MA, February, 1990. "Pain in neonates: common myths and current scientific facts."

Critical Care Medicine Seminars, Department of Anesthesiology and Critical Care Medicine, The Johns Hopkins Hospital, Baltimore, July, 1990. "Management of pain in the ICU."

Clinical Symposium, Department of Anesthesiology and Intensive Care, Children's Hospital, University of Goteberg, Goteberg, Sweden, September, 1990. "Recent findings from studies on surgical metabolism in neonates."

Pediatric Grand Rounds, Department of Pediatrics, Children's Hospital, University of Goteberg, Goteberg, Sweden, September, 1990. "Neuroanatomy, Neurophysiology, and Neurochemistry of Pain in Newborns and Children."

Joint Perinatal Symposium, Nobel Institute for Neurophysiology, Karolinska Institute, and Department of Pediatrics, Karolinska Hospital, Stockholm, Sweden, September, 1990. "Pain and

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its Effects in the Human Neonate.”

Perinatal Grand Rounds, Berkshire Medical Center, Pittsfield, MA, October, 1990. “Assessing and Managing Pain in Neonates.”

Topics in Pediatrics, Berkshire Area Health Education Center, Pittsfield, MA, October, 1990. “Do newborns feel pain?”

## 1991

11<sup>th</sup> Myron B. Laver International Postgraduate Course, Department of Anaesthesia, University of Basel, Basel, Switzerland, March, 1991. “Developmental aspects of Pain.”

10<sup>th</sup> Annual Meeting, American Pain Society, New Orleans, LA, November, 1991. Keynote Address: “Pain in the Newborn.”

Junior Resident Rounds, Department of Medicine, Children’s Medical Center, Fort Worth, TX, February, 1991. “Pain and stress responses in neonates.”

Medicine Grand Rounds, Cook-Forth Worth Children’s Medical Center, Fort Worth, TX, February, 1991. “Assessing and managing pain in infants.”

Anesthesia Grand Rounds, University of Washington Department of Anesthesiology, Seattle, WA, March, 1991. “Pain and stress responses in neonates: Anesthetic effects.”

Pediatric Grand Rounds, University of Washington Department of Pediatrics, Children’s Hospital and Medical Center, Seattle, WA, March, 1991. “Developmental biology and clinical aspects of pain in infancy.”

Neonatology Seminars, Division of Neonatal and Respiratory Diseases, University of Washington Medical Center, Seattle, WA, March, 1991. “Management of pain and stress in the Neonatal Intensive Care Unit.”

Junior Resident Rounds, Department of Medicine, Children’s Hospital, Boston, MA, April, 1991. “Philosophical basis for facing the issues of death and dying in pediatric patients.”

Core Curriculum Lectures, Department of Medicine, Children’s Hospital, Boston, MA, May, 1991. “Cardiovascular monitoring parameters: Pitfalls and usefulness in clinical medicine.”

Anesthesia Grand Rounds, Department of Anesthesia, Children’s Hospital, Boston, MA, October, 1991. “Metabolic changes during newborn surgery.”

## 1992

Greater Boston Chapter, American Association of Critical Care Nursing, Boston, MA, January,

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1992. "Pain in the neonate: basic sciences, assessment and management."

International Pain Symposium, Medical College of Georgia, Atlanta, GA, April, 1992.  
"Development of pain pathways."

International Pain Symposium, Medical College of Georgia, Atlanta, GA, April, 1992. Panel discussion on "Basic mechanisms of pain."

Annual Perinatal Symposium, University of Michigan, Ann Arbor, MI. May, 1992. "Pain and its clinical management in neonates."

21<sup>st</sup> Educational and Scientific Symposium, Society of Critical Care Medicine, San Antonio, TX, May, 1992. Panel discussion on "Endocrine response in the critically ill."

10<sup>th</sup> World Congress of Anesthesiologists, The Hague, The Netherlands, June, 1992. Refresher Course on "Surgical stress and metabolism in neonates."

1<sup>st</sup> World Congress of Pediatric Intensive Care, Baltimore, MD, June, 1992. "Stress responses and clinical outcome in newborn infants and children."

Special Ross Conference on "Hot Topics in Neonatology 1992", Washington, DC, December, 1992. "Analgesia and sedation in the Neonatal Intensive Care Unit."

Anesthesia Journal Club, Department of Anesthesia, Massachusetts General Hospital, Boston, MA, January, 1992. "Stress responses in neonatal cardiac surgery."

Neonatology Grand Rounds, The Medical Center of Central Massachusetts - Memorial, Worcester, MA, March, 1992. "Pain control in the neonate."

Anesthesia Grand Rounds, University of Michigan Medical Center, C.S. Mott Children's Hospital, Ann Arbor, MI, May, 1992. "Anesthesia and stress responses in neonates."

Pediatric Grand Rounds, University of Michigan Medical Center, C.S. Mott Children's Hospital, Ann Arbor, MI, May, 1992. "Pain in the neonate: scientific background and clinical approaches."

Respiratory Intensive Care Unit Seminars, Departments of Medicine, Surgery, & Anesthesia, Massachusetts General Hospital, Boston, MA, July, 1992. "Stress responses and clinical outcome in critical illness."

Fellows Conference, Division of Pediatric Intensive Care, Massachusetts General Hospital and Harvard Medical School, Boston, MA, September, 1992. "Newer agents for analgesia and sedation."

Pediatric Grand Rounds, Joint CME Program, Lawrence General Hospital and Holy Family Hospital, Lawrence, MA, October, 1992. "Analgesia and sedation in pediatric patients."

CME Seminars, Departments of Obstetrics and Neonatology, Georgetown University and The

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Arlington Hospital, Arlington, VA, October, 1992. "Pain in the neonate: Myths and Realities."

CME Seminars, Departments of Obstetrics and Neonatology, Georgetown University and The Arlington Hospital, Arlington, VA, October, 1992. "Neonatal stress and responses."

CME Seminars, Departments of Obstetrics and Neonatology, Georgetown University and The Arlington Hospital, Arlington, VA, October, 1992. "Assessment and management of pain in the neonate."

CME Seminars, Departments of Obstetrics and Neonatology, Georgetown University and The Arlington Hospital, Arlington, VA, October, 1992. "Case discussions: Pediatric and neonatal pain management."

Research Seminars, Division of Critical Care Medicine, Children's Hospital of Dallas, University of Texas, Southwestern Medical School, Dallas, TX, October, 1992. "Pain and stress responses in neonates."

Pediatric Grand Rounds, Department of Pediatrics, The Rhode Island Hospital, Brown University, Providence, RI, October, 1992. "Pain in the neonate: myths and realities."

Research-in-Progress Seminars, Department of Pediatrics, Yale University, Yale-New Haven Hospital, New Haven, CT, November, 1992. "Pain and memory in the neonate."

### 1993

3<sup>rd</sup> International Meeting on Pediatric Intensive Care, Padova, Italy, June, 1993. "Role of analgesia in the clinical outcome of critically ill pediatric patients."

11<sup>th</sup> Annual Panhandle Regional Perinatal Symposium: "Challenges and Issues in Perinatal Care," Amarillo TX, October, 1993. "Development of Pain Perception in Fetal and Neonatal Life."

11<sup>th</sup> Annual Panhandle Regional Perinatal Symposium: "Challenges and Issues in Perinatal Care", Amarillo TX, October, 1993. "Clinical Assessment and Management of Pain in the Neonate."

Pediatric Grand Rounds, Department of Pediatrics, I.W. Killam Children's Hospital, Dalhousie University, Halifax, Nova Scotia, Canada, February, 1993. "Pain in neonatal and pediatric intensive care."

Psychology Grand Rounds, Department of Psychology, Dalhousie University, Halifax, Nova Scotia, Canada, February, 1993. "Developmental neurobiology of pain in humans."

Pediatric Grand Rounds, Department of Pediatrics, Cambridge Hospital and Mount Auburn Hospital, Harvard Medical School, Boston, MA, February, 1993. "Clinical importance of pain in neonates."

Pediatric Grand Rounds, Department of Pediatrics, Emory University and Egleston Children's

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Hospital, Atlanta GA, December, 1993. “Assessment and management of pain in infants and children.”

### 1994

23<sup>rd</sup> Educational and Scientific Symposium, Society of Critical Care Medicine, “Thinking About Tomorrow”, February 1994, Orlando, FL “Metabolic Response to Stress in the Critically Ill Infant.”

NICHD Symposium on “Neonatal Pain: Physiology and Management”, Philadelphia PA, June, 1994. “Long-term clinical outcomes of repetitive neonatal pain: behavioral changes in rats”.

3<sup>rd</sup> International Symposium on Pediatric Pain, International Association for the Study of Pain, Special Interest Group on Pain in Children, Philadelphia, PA, June, 1994. “Research in neonatal pain/stress: A personal journey.”

3<sup>rd</sup> International Symposium on Pediatric Pain, International Association for the Study of Pain, Special Interest Group on Pain in Children, Philadelphia PA, June, 1994. “Current practices for analgesia and sedation in neonates.”

Symposium on ‘Strategies to Evaluate and Reduce Stress in Babies’, Institute of Obstetrics and Gynecology, London, U.K., October, 1994. “The importance of pain and stress in critically ill newborn infants”.

International Symposium on “Pain in Infants: Assessment and Management”, Emory University School of Medicine, October, 1994. “Management of Acute Pain: an Overview”.

Pediatric Grand Rounds, Department of Pediatrics, Emory University and Grady Memorial Hospital, Atlanta GA, January, 1994. “Brain death: definition and evaluation in children.”

Pediatric Grand Rounds, Alfred I. duPont Institute and Jefferson Medical College, Wilmington DE, February, 1994. “Pain and Clinical Outcomes in Neonatal Intensive Care.”

Neonatal Physiology Symposium, Department of Pediatrics, University of Illinois, Chicago IL, May, 1994. “Developmental neurobiology of pain in neonates.”

Pediatric Grand Rounds, Mercy Hospital and Medical Center and University of Chicago, May, 1994. “Assessment and Management of Pain in Neonates”.

Anesthesiology Seminars, Egleston Children’s Hospital at Emory University, Atlanta, GA, July, 1994. “The stress response to anesthesia and surgery and its clinical implications”.

### 1995

Symposium on “Practical Neonatal Pharmacology” University of North Carolina, Area Health Education Centers Program, January, 1995, Raleigh, NC. “Pharmacologic treatment of pain and



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discomfort in the NICU.”

Symposium on “Practical Neonatal Pharmacology” University of North Carolina, Area Health Education Centers Program, January, 1995, Raleigh, NC. “The physiology of pain in neonates.”

5<sup>th</sup> Annual Southeast ECMO Conference, May, 1995, Atlanta, GA. “Analgesia and sedation in pediatric ECMO patients.”

Nordic Congress on Children and Pain, September, 1995, Stockholm, Sweden. Keynote Address: “Of needles, tubes, and prematurity: What happens to the baby?”

2<sup>nd</sup> World Congress & Exposition on “Child Health 2000”, Global Child Health Society, Health Canada, WHO, UNICEF, American Academy of Pediatrics, International Pediatric Association, and University of British Columbia, Vancouver, B.C., May, 1995. “Impact of pain in critically ill newborn infants and children”.

2<sup>nd</sup> World Congress & Exposition on “Child Health 2000”, Global Child Health Society, Health Canada, WHO, UNICEF, American Academy of Pediatrics, International Pediatric Association, and University of British Columbia, Vancouver, B.C., May, 1995. “Pain and stress in NICU care: Has actual therapy changed?”

72<sup>nd</sup> Annual Conference of the Canadian Pediatric Society, Symposium on “Pain in the Neonate”, Montreal (PQ), Canada, June, 1995. “Physiology and management of pain in the neonate.”

National Conference on “Practical Neonatal Pharmacology” University of North Carolina, Area Health Education Centers Program, September, 1995, Atlanta, GA. “Sedatives and Non-Opioid Analgesics”

National Conference on “Practical Neonatal Pharmacology” University of North Carolina, Area Health Education Centers Program, September, 1995, Atlanta, GA. “Conscious Sedation: working through the issues”

Pediatric Critical Care Colloquium, Panel Discussion on “Pediatric Pain: Measurement and Therapy”, Sea Island, GA, October, 1995.

Symposium on “Changes, Challenges and Controversies in Neonatal Care”, Regional Conference for Neonatal Nursing and Eggleston Children’s Health Care System, Atlanta, GA, October, 1995. “Clinical Indications and Problems in the Use of Sedatives and Analgesics in the Neonatal ICU”.

Symposium on “Pediatric Pain Research in The Netherlands”, Sophia Children’s Hospital, Rotterdam, The Netherlands, October, 1995. “Differentiation between pain and stress in neonates”.

XVII Annual Congress, Dutch Pediatric Association, Veldhoven, The Netherlands, November, 1995. Keynote Address: “Physiology and long-term effects of pain in neonates.”

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Conference on “Pediatric Pain: Challenges, Innovations, and Costs”, Emory University School of Medicine and Egleston Children’s Hospital, Atlanta GA, November, 1995. “A clinical primer in the use of opioids”.

Conference on “Pediatric Pain: Challenges, Innovations, and Costs”, Emory University School of Medicine and Egleston Children’s Hospital, Atlanta GA, November, 1995. “Neonatal pain: current issues and future directions”.

Contemporary Forums Annual Conference on ‘Developmental Interventions in Neonatal Care’, Chicago IL, (USA), November 1995. “Immediate and long-term effects of pain on neonatal brain development.”

Pediatric Pain Symposium, Hilleroed Sygehus, Denmark, December, 1995. “Physiology of pain during fetal and neonatal development.”

Pediatric Pain Symposium, Hilleroed Sygehus, Denmark, December, 1995. “Changes in adult behavior correlated with repetitive neonatal pain: experimental studies”.

International Conference, The World Foundation for Pain Relief and Research, ‘Current Concepts in Acute, Chronic, and Cancer Pain Management’, December, 1995, New York NY. “Development and Assessment of Pain in Neonates and the Pediatric Population”.

Multidisciplinary Seminars, Marcus Developmental Center and Emory University School of Medicine, Atlanta GA, February 1995. “The long-term sequelae of early pain and stress in ex-premature neonates.”

Pediatric Grand Rounds, Department of Pediatrics, Emory University and Egleston Children’s Hospital, Atlanta GA, March 1995. “A practical approach to acid-base homeostasis in pediatric patients.”

Basic Science Fellows Conference, Department of Pediatrics, Emory University School of Medicine, Atlanta GA, March 1995. “Long-term effects of neonatal pain and stress”.

Psychiatry Research Seminars, Department of Psychiatry and Behavioral Sciences, Emory University School of Medicine, Atlanta GA, March 1995. “Behavioral and neurobiologic studies on the long-term effects of neonatal pain and stress”.

Teaching Seminars, Neonatal Nurse Practitioner Course, Emory University School of Nursing, Atlanta GA, March 1995. “Physiological basis for development of the pain system”, “Assessment and management of pain and stress in critically ill neonates”.

Panel discussion on “Does pain have a thermometer?”, on the “Hurt Alert Day”, Child Life Department, Egleston Children’s Hospital at Emory University, Atlanta GA, March 1995.

Research Presentations, Georgia Biomedical Partnership, Inc.; April 1995; “Clinical and socio-economic importance of pain in the newborn infant”.

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Pediatric Grand Rounds, Parkway Medical Center, Columbia-HCA Health Care System, Lithia Springs GA, June 1995; “Assessment and management of pain in newborn infants”.

Anesthesiology Seminars, Department of Anesthesia, Emory University School of Medicine and Egleston Children’s Hospital, Atlanta GA, July 1995; “Physiology and assessment of pain in pediatric patients”.

CCM Research Seminars, Department of Pediatrics, University of Florida Health Sciences Center, Jacksonville FL, July 1995. “Recent and ongoing research on neonatal pain”.

Acute Care Symposium, Department of Pediatrics, Emory University School of Medicine, Atlanta GA, July 1995; “Pediatric C.P.R. or How to run a “Code” in pediatric patients”.

Fellows Research Introductory Course, Department of Pediatrics, Emory University School of Medicine, Atlanta GA, July 1995; Panel discussion on “How to Establish an Academic Career”.

Emergency Medicine Lecture Series, Emory University School of Medicine, Atlanta GA, August 1995; “Analgesia and Sedation in Pediatric Patients”.

Anesthesia Grand Rounds, Department of Anesthesiology and Critical Care Medicine, Medical College of Wisconsin, Milwaukee WI, November 9, 1995. “Effects of anesthesia on surgical stress and clinical outcome”.

Pediatric Grand Rounds, Department of Pediatrics, Medical College and Children’s Hospital of Wisconsin, Milwaukee WI, November 10, 1995. “Pain and its effects in the neonate”.

## 1996

International Symposium on Fetal Pain, University of Toronto, Toronto (Ont.) Canada, April, 1996. “Development of the Pain System”.

21<sup>st</sup> Annual Symposium on Care of the Sick Newborn, University of California at Irvine and Long Beach Memorial Medical Center, Long Beach CA, April, 1996. Plenary Lecture: “Developmental Neurobiology of the Perception of Pain”

Symposium on Pediatric Pain, Texas A & M University Health Science Center and Scott & White Hospital, Austin TX, May, 1996. “Consequences of injury: does pain management make a difference?”

Symposium on Pediatric Pain, Texas A & M University Health Science Center and Scott & White Hospital, Austin, May, 1996. “Assessment and management of pain in the critically ill infant and child.”

Symposium on Pediatric Pain, Texas A & M University Health Science Center and Scott & White Hospital, Austin TX, May, 1996. “Pain in the NICU: assessing and managing pain in critical

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illness”.

Symposium on Pediatric Pain, Texas A & M University Health Science Center and Scott & White Hospital, Austin, May, 1996. “Establishing a children’s pain service”.

4<sup>th</sup> Annual Neonatal Conference, University of Teesside, Middlesborough, U.K., June, 1996. “The international NOPAIN study”.

4<sup>th</sup> Annual Neonatal Conference, University of Teesside, Middlesborough, U.K., June, 1996. “Metabolic consequences of operative and postoperative care in newborns”.

Postgraduate Course on Pediatric Intensive Care, 2<sup>nd</sup> World Congress on Pediatric Intensive Care, Rotterdam, The Netherlands, June, 1996. “The evolution of a clinical problem towards a sound research question.”

Postgraduate Course on Pediatric Intensive Care, 2<sup>nd</sup> World Congress on Pediatric Intensive Care, Rotterdam, The Netherlands, June, 1996. “Neuronal pathways and maturational aspects of pain.”

2<sup>nd</sup> World Congress on Pediatric Intensive Care, Rotterdam, The Netherlands, June, 1996. “Developmental physiology and neurobiology of the pain system.”

2<sup>nd</sup> World Congress on Pediatric Intensive Care, Rotterdam, The Netherlands, June, 1996. “Analgesia and sedation in the critically ill neonate and child.”

8<sup>th</sup> World Congress on Pain, International Association for the Study of Pain, August, 1996, Vancouver (B.C.), Canada. Pediatric Plenary Lecture: “Long-term effects of pain in neonates and infants”.

8<sup>th</sup> World Congress on Pain, International Association for the Study of Pain, August, 1996, Vancouver (B.C.), Canada. Topical Workshop: “Challenges and opportunities in postoperative and critical care pain management of children.”

International Forum on Pediatric Pain, ‘Measurement of Children’s Pain’, Halifax, Nova Scotia, Canada, October, 1996. “Biochemical and biophysical methods correlated with the assessment of pain at supraspinal levels of the brain.”

16<sup>th</sup> Annual Convention, National Neonatology Forum, Chandigarh, India, November, 1996. “Clinical importance of pain and stress in the Neonatal Intensive Care Unit.”

Neonatal Symposium, Georgia Nurses Association, Dekalb Medical Center, Atlanta GA, December, 1996. “Effects of repetitive neonatal pain on immediate and long-term clinical outcomes of prematurity.”

Fellows Research Conference, Department of Pediatrics, Emory University School of Medicine, March, 1996. “Current analgesic practices in the NICU: national and international studies”.

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Teaching Seminars, Neonatal Nurse Practitioner Training Program, Nell R. Hodgson School of Nursing, Emory University, March, 1996. "Assessment and management of pain in preterm neonates".

Teaching Seminars, Clinical Chaplain Internship Program, Emory University and Egleston Children's Hospital, March, 1996. "The scientific philosophy of death and dying: applications for patient care".

Pediatric Grand Rounds, Department of Pediatrics, Emory University School of Medicine and Egleston Children's Hospital, May, 1996. "Presentations at the Pediatric Academic Societies Meetings' in 1996".

2<sup>nd</sup> Annual Fellows Research Introductory Course, Department of Pediatrics, Emory University School of Medicine, Atlanta GA, August 1996; Clinical Research Methods Workshop: "Measurement and sampling, sources of error and bias in clinical studies."

2<sup>nd</sup> Annual Fellows Research Introductory Course, Department of Pediatrics, Emory University School of Medicine, Atlanta GA, August 1996; Evaluation of Clinical Research Protocols.

Pediatric Grand Rounds, Case Western Reserve University, Rainbow Babies and Children's Hospital, Cleveland OH, November, 1996. "Assessment and Management of Acute Pain in Pediatric Patients".

Research Seminar, Division of Pharmacology and Critical Care, Department of Pediatrics, Case Western Reserve University, Rainbow Babies and Children's Hospital, Cleveland OH, November, 1996. "Long-term effects of pain in neonates: Clinical and neurobiological aspects."

## 1997

International Conference, The Physical and Developmental Environment of the High-Risk Infant, University of South Florida College of Medicine, January 30-February 1, 1997. "Pain and pain management in newborn infants."

Annual Winter Meeting, Society of Pediatric Anesthesia, February, 1997, San Antonio TX. "Physiologic rationale for pain management in neonates."

Fifth Annual Conference on Advanced Practice in Neonatal Care, Emory Regional Perinatal Center, April, 1997, Atlanta GA. "Scientific evaluation of pain and analgesia in preterm neonates: The NOPAIN Multicenter Trial".

Panel discussant, Satellite News Conference from the White House on "Early Childhood Development and Learning: What the newest research on the brain tells us about our youngest children", April, 1997, Egleston Children's Hospital, Atlanta, GA.

Fourth International Pediatric Pain Symposium, Special Interest Group on Pediatric Pain, International Association for the Study of Pain, July, 1997, Helsinki, Finland. Debate "The treatment of pain in children should not be based on self-report of pain".



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Fourth International Pediatric Pain Symposium, Special Interest Group on Pediatric Pain, International Association for the Study of Pain, July, 1997, Helsinki, Finland. “Mechanisms, clinical assessment, and management of opioid tolerance in children.”

International Symposium on Analgesia, Sedation, and Neuromuscular Blockade in Children, Federal University of Medicine, Sao Paulo, Brazil, September, 1997. “Hormonal and metabolic stress responses to pain and injury in the neonate.”

International Symposium on Analgesia, Sedation, and Neuromuscular Blockade in Children, Federal University of Medicine, Sao Paulo, Brazil, September, 1997. “Treatment of pain in the neonate.”

International Symposium on Analgesia, Sedation, and Neuromuscular Blockade in Children, Federal University of Medicine, Sao Paulo, Brazil, September, 1997. “Long-term effects of pain in the neonate.”

Annual Meeting of the Perinatal Section, American Academy of Pediatrics, Chicago IL, September, 1997. “Clinical management of neonatal pain.”

48<sup>th</sup> Annual Meeting, American Association for Laboratory Animal Science, Anaheim CA, November, 1997. “Neonatal pain perception: Where do we draw the line?”

International Conference, The World Foundation for Pain Relief and Research, ‘Current Concepts in Acute, Chronic, and Cancer Pain Management’, December, 1997, New York NY. “Development and assessment of pain in newborn infants and children”.

Teaching Seminars, Neonatal Nurse Practitioner Training Program, Nell R. Hodgson School of Nursing, Emory University, March, 1997. “Assessment and management of pain in preterm neonates”.

Pediatric Grand Rounds, Department of Pediatrics, McGill University and Montreal Children’s Hospital, April, 1997. “Benefits and drawbacks of analgesia/sedation in critically ill pediatric patients”.

Nursing Grand Rounds, Faculty of Nursing, McGill University and Montreal Children’s Hospital, April, 1997. “Long-term effects of pain and stress in newborn infants and older children”.

Pediatric Grand Rounds, Department of Pediatrics, University of Montreal and Hospital Saint Justine, April, 1997. “Benefits and drawbacks of analgesia/sedation in critically ill pediatric patients”.

Pediatric Grand Rounds, Department of Pediatrics,, Medical College of Georgia, April, 1997, Augusta GA. “Of needles, tubes, and prematurity: What happens to the baby?”.

Anesthesiology Seminars, Department of Anesthesia, Medical College of Georgia, April, 1997. “Assessment and management of analgesia/sedation in newborn infants”.

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Guest Lecturer, The Institute of Hospice, Hospice Atlanta Center, May, 1997. "Pain management in children: are we negligent?"

Pediatric Grand Rounds, Department of Pediatrics, Emory University School of Medicine, and Egleston Children's Hospital, May, 1997. "Does routine analgesia alter the clinical outcomes of ventilated preterm neonates?"

Research Seminars, Arkansas Children's Hospital Research Institute, University of Arkansas for Medical Sciences, Little Rock AR, October, 1997. "Neonatal Pain: Effects on the brain and behavior."

Anesthesiology Grand Rounds, Department of Anesthesiology, UCLA School of Medicine, Los Angeles Children's Hospital, November, 1997. "Long-term effects of pain in neonates: animal & human data."

### 1998

27<sup>th</sup> Educational and Scientific Symposium, Society for Critical Care Medicine, 'Current Concepts in Pediatric Critical Care 1998', February, 1998, San Antonio TX. "Overview of pain and analgesia in pediatric patients: biochemistry, physiology, and pharmacology".

Interdisciplinary Workshop on "The Science and Practice of Mind/Body Interactions", March, 1998, Sedona AZ, "Short- and long-term effects of pain in the neonate".

12<sup>th</sup> Annual Symposium on Critical Care and Emergency Medicine, April, 1998, Hot Springs AR. "Analgesia and sedation in the ICU".

International Consensus Conference on "Pain and Pain Management during Infancy", April, 1998, Nice, France. "Epidemiology of pain in neonates".

International Consensus Conference on "Pain and Pain Management during Infancy", April, 1998, Nice, France. "New alternatives for pain management in the future".

9<sup>th</sup> Annual Congress, European Society of Pediatric Intensive Care, September, 1998, Stockholm, Sweden. "Future impact of repeated neonatal procedural pain".

9<sup>th</sup> Annual Congress, European Society of Pediatric Intensive Care, September, 1998, Stockholm, Sweden. "Analgesics for neonatal intensive care".

2<sup>nd</sup> Biennial Pediatric Pain Forum, University of Dalhousie, September, 1998, Halifax, Nova Scotia, Canada. "Persistent effects of early pain experience (the animal literature)".

11<sup>th</sup> Western Extracorporeal Membrane Oxygenation Conference 'Back to the Future', October, 1998, Little Rock AR. "Recognition and management of pain during ECMO".

17<sup>th</sup> Annual Scientific Meeting, American Pain Society, San Diego, CA, November, 1998.

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“Scientific Bases for the Definition of Pain”, Moderator.

Annual Conference, Dutch Pain Society, Rotterdam, The Netherlands, November, 1998. Keynote Address: “Long-term effects of pain in neonates.”

NICU Research Conferences, Department of Pediatrics, University of Chicago Children’s Hospital, Chicago IL, February, 1998. “Current controversies in the management of pain in neonates.”

Pediatric Grand Rounds, Department of Pediatrics, University of Chicago Children’s Hospital, Chicago IL, February, 1998. “Of needles, tubes, and prematurity: what happens to the baby?”

Anesthesiology and Critical Care Grand Rounds, Department of Anesthesiology, Children’s Memorial Hospital, University of Illinois, Chicago IL, February, 1998. “Long-term effects of neonatal pain and stress.”

Grand Rounds, Department of Pediatrics, University of Arkansas for Medical Sciences, Arkansas Children’s Hospital, February, 1998. “Does routine analgesia alter the clinical outcomes of preterm neonates?”

Anesthesia Research Seminars, Department of Anesthesia, University of Arkansas for Medical Sciences, Arkansas Children’s Hospital, April, 1998. “Effects of pain in the neonate.”

Research & Teaching conference, Department of Surgery, University of Arkansas for Medical Sciences, Arkansas Children’s Hospital, April, 1998. “Prediction of resource utilization in pediatric surgical patients.”

Lectures for Junior Medical Student Clerkship, University of Arkansas for Medical Sciences, August 7, September 4, October, 1998. “Overview of pain in children”.

NICU Research Seminars, Hospital for Sick Children and University of Toronto, Toronto, Canada. August, 1998. “Recent advances in neonatal pain & pain management”.

Semi-Annual Medical Staff Meeting, Arkansas Children’s Hospital, Little Rock, Arkansas, September, 1998. “Analgesia and sedation in terminally ill children”.

Advanced Pediatric Life Support Course, Arkansas Children’s Hospital, Little Rock, September, 1998. “Status epilepticus.”

Neonatology Seminars, Department of Pediatrics, U.A.M.S. and Arkansas Children’s Hospital, September, 1998. “Data and design of the NOPAIN trial.”

Pediatric Outreach Seminars, Area Health Education Center, Pine Bluff, Arkansas, October, 1998. “Clinical approach to pain in children.”

Neonatal Grand Rounds, Sharp Mary Birch Hospital for Women, San Diego, November, 1998. “Management of pain in the NICU.”

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Sharp Health Care Educational Conference on “Responding to Neonatal Pain”, November, 1998. “Neonatal pain anatomy and physiology.”

Research Seminars, UAMS Department of Anesthesiology, November, 1998. “Prediction of resource utilization in pediatric surgical patients.”

Sharp Health Care Educational Conference on “Responding to Neonatal Pain”, November, 1998. “Systemic analgesia in the neonate.”

Sharp Health Care Educational Conference on “Responding to Neonatal Pain”, November, 1998. “Local, regional and topical analgesia in the neonate.”

Community Neonatology Meeting, San Diego Area hospitals and University of California, November, 1998. “Recent research in neonatal pain management.”

### 1999

Neonatal Pain Management Symposium, Department of Pediatrics, University of Washington and Swedish Medical Center, Seattle, WA, March, 1999. “Management of pain in neonates.”

6<sup>th</sup> International Congress of Pediatric Emergency & Intensive Care, Padova, Italy, June, 1999. “Pain in critically ill infant and child: What we know, what we fear, what we can do?”

Pediatric Pain Meeting, International Planning Group for Clinical Studies, G. D. Searle Company, Chicago, IL. July, 1999. "Evaluation of COX-II inhibitors for analgesia in children."

2<sup>nd</sup> International Consensus Conference on Guidelines for the Prevention and Management of Procedural Pain in Infancy, Baden, Austria, August, 1999. “Neonatal pain management using systemic analgesics.”

Fifth Greater Tulsa Area Pain Conference, University of Oklahoma and Greater Tulsa Nursing College, Tulsa, OK. October, 1999. Keynote Address: "Of needles, tubes, and prematurity: What happens to the baby?"

Pediatric Trauma/Critical Care Symposium, Departments of Nursing, Critical Care Medicine, and Emergency Medicine, Arkansas Children's Hospital, Little Rock, AR. October, 1999. “Pain Management in Critically Ill Children”

52<sup>nd</sup> Annual Meeting, American Academy of Pediatrics, Washington DC, October, 1999. Plenary Podium Presentation: “Neonatal pain and clinical outcomes.”

International Symposium on “Basic Mechanisms and Recent Advances in Pediatric Pain”, German Pediatric Association and University of Erlangen, Kloster Weltenberg, Bavaria, Germany, October, 1999. “Long-term effects of pain in neonates: Clinical and neurobiological investigations.”

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IIIrd Congreso Internacional De Clinica Del Dolor Y Cuidados Paliativos, Asociacion Mexicana De Algologia A.C., Ciudad y Puerto de Veracruz, Veracruz, México, October, 1999. "Long-term effects of neonatal pain".

IIIrd Congreso Internacional De Clinica Del Dolor Y Cuidados Paliativos, Asociacion Mexicana De Algologia A.C., Ciudad y Puerto de Veracruz, Veracruz, México, October, 1999. "Of needles, tubes, and prematurity: What happens to the baby?"

IIIrd Congreso Internacional De Clinica Del Dolor Y Cuidados Paliativos, Asociacion Mexicana De Algologia A.C., Ciudad y Puerto de Veracruz, Veracruz, México, October, 1999. "Management of neonatal pain: current therapies and novel options."

"Sedation, Analgesia, and Neuromuscular Blockade", UAMS Residents PICU Lecture Series; monthly lecture, January through December, 1999.

"Pain in Children", UAMS Junior Medical Students Pediatric Clerkship Series; July 7, August, 30, 1999.

Journal Club Discussant, Department of Anesthesiology, University of North Carolina at Chapel Hill & UNC Hospitals, Chapel Hill, NC, February, 1999. "Do perinatal events lead to adult self-destructive behavior?"

Anesthesia Grand Rounds, University of North Carolina at Chapel Hill, Department of Anesthesiology, Chapel Hill, NC, February, 1999. "Of needles, tubes, and prematurity: What happens to the baby?"

Research Seminars, Department of Pediatrics, University of North Carolina at Chapel Hill, Chapel Hill, NC, February, 1999. "Management of pain in neonates."

Seminars in Psychobiology, New York Psychiatric Institute, Columbia University College of Physicians and Surgeons, New York NY, March, 1999. "Mechanisms underlying the long-term effects of pain in neonates."

Department of Neonatology, Columbia-Presbyterian Hospital for Women and Children, New York NY, March, 1999. "Clinical outcomes resulting from repetitive pain during NICU care."

Grand Rounds, Department of Family Practice, University of Connecticut and Hartford Medical Center, Hartford, March, 1999. "Clinical approach to pain management in your practice."

Grand Rounds, Department of Pediatrics, University of Connecticut and Connecticut Children's Medical Center, Hartford, CT, March, 1999. "Effects of neonatal pain: mechanisms and clinical outcomes."

University of Arkansas for Medical Sciences, Neuroscience Course, Pre-clinical Medical Students, Department of Anatomy, Little Rock, AR; April, 1999. "Anatomy and physiology of the pain system."



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Grand Rounds, Department of Pediatrics and Arkansas Children's Hospital, University of Arkansas for Medical Sciences, Little Rock, AR. July, 1999. "Can perinatal stimulation alter brain development and subsequent behavior?"

Research Presentations, Medical Research Endowment Board, University of Arkansas for Medical Sciences, Little Rock, AR. October, 1999. "Does isolation increase apoptosis in the neonatal rat brain?"

## 2000

Annual Meeting, Danish Pediatric Society and University Hospital, Copenhagen, Denmark, January, 2000. Keynote Speaker: "Repetitive pain in neonates: clinical and laboratory studies."

International Symposium on Infant Pain, Astrid Lindgren's Children's Hospital and the Karolinska Institute, Stockholm, Sweden, January, 2000. Keynote Address: "Repetitive pain in neonates: windows from the laboratory bench."

International Symposium on Infant Pain, Astrid Lindgren's Children's Hospital and the Karolinska Institute, Stockholm, Sweden, January, 2000. "Repetitive pain in neonates: windows from the hospital bedside."

"Pediatric Anesthesiology 2000", Joint Annual Meeting of the Society for Pediatric Anesthesia & Section of Anesthesiology, American Academy of Pediatrics, Sanibel Island, Sanibel, FL, February, 2000. Baxter Visiting Professor, Plenary Session: "Prevention of opioid and benzodiazepine withdrawal syndromes."

27<sup>th</sup> Neonatal & Infant Symposium, University of California at Irvine, College of Medicine, Vail, Colorado, March, 2000. "Mechanisms of pain in the fetus and neonate"

27<sup>th</sup> Neonatal & Infant Symposium, University of California at Irvine, College of Medicine, Vail, Colorado, March, 2000. "Do ventilated premature infants require analgesia?"

27<sup>th</sup> Neonatal & Infant Symposium, University of California at Irvine, College of Medicine, Vail, Colorado, March, 2000. "Pain in the neonate: Current practice & options."

27<sup>th</sup> Neonatal & Infant Symposium, University of California at Irvine, College of Medicine, Vail, Colorado, March, 2000. "Long-term effects of neonatal pain & stress"

27<sup>th</sup> Neonatal & Infant Symposium, University of California at Irvine, College of Medicine, Vail, Colorado, March, 2000. "Prediction clinical outcomes in pediatric surgical patients"

Symposium on "Pain in Children: Conquering the Hurt", Pain Awareness Week, The Hospital for Sick Children & University of Toronto, Toronto, Canada, March, 2000. Keynote Speaker: "Long-term effects of pain in neonates: Clinical and molecular aspects."

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5<sup>th</sup> Annual Symposium on Pediatric Pain, Texas A & M University, Department of Anesthesiology, Scott & White Hospital, San Antonio, TX , April, 2000, “Long-term effects of neonatal pain”

5<sup>th</sup> Annual Symposium on Pediatric Pain, Texas A & M University, Department of Anesthesiology, Scott & White Hospital, San Antonio, TX, April, 2000. “Pain management of the critically ill infant and child”

5<sup>th</sup> International Symposium on Pediatric Pain, Special Interest Group for Pain in Children, International Association for the Study of Pain, London, England, June, 2000. Workshop Presentation: “Effects of repetitive pain on neurologic outcome and behavior.”

3<sup>rd</sup> World Congress on Pediatric Intensive Care, Montreal Canada, Co-Chairman of the Pharmacology, Pain & Sedation Track, June, 2000.

3<sup>rd</sup> World Congress on Pediatric Intensive Care, Montreal Canada, Nursing Program, June, 2000. Plenary Presentation: “The physiology of pain.”

3<sup>rd</sup> World Congress on Pediatric Intensive Care, Montreal Canada, Pharmacology, Pain & Sedation Track, June, 2000. Plenary Presentation: “Analgesia and sedation in neonates.”

3<sup>rd</sup> World Congress on Pediatric Intensive Care, Montreal Canada, Pharmacology, Pain & Sedation Track, June, 2000. Symposium Session: “Drug dose modification in prematurity.”

3<sup>rd</sup> World Congress on Pediatric Intensive Care, Montreal Canada, Chairman of the Pharmacology, Pain & Sedation Track, June, 2000. Joint Plenary: “Future Directions”. Annual Meeting, American Society of Anesthesiologists, San Francisco, CA; Panel Discussion: Pain Management in Children: Biology and Clinical Applications, October, 2000. “The neuroplasticity of pain in the newborn”.

Annual Meeting, American College of Surgeons, Chicago IL; Workshop on Metabolic Support of the Pediatric Surgical Patient, October, 2000. “Alterations of the acute metabolic stress response related to painful stimuli in children”.

19<sup>th</sup> Annual Scientific Meeting, American Pain Society, Atlanta GA; November, 2000. Problem-based, Case-oriented, Active discussion on Chronic Pain Management: “Opioid tolerance in the I.C.U.”

Research & Teaching Seminars, Department of Paediatrics, All-India Institute for Medical Sciences, New Delhi, India. January, 2000. "Can perinatal stimulation alter brain development and future behavior?"

CME Conference, Indian Association of Paediatrics (NOIDA Branch), Noida Medical Center, New Delhi, India. January, 2000. "Management of pain and sedation in pediatric patients."

Neuroscience Research Seminars, Astrid Lindgren's Children's Hospital and the Karolinska

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Institute, Stockholm, Sweden, January, 2000. "Ontogeny of supraspinal pain processing in infant rats."

Grand Rounds, Department of Pediatrics, University of Tennessee and Le Bonheur Children's Hospital, Memphis, TN, May, 2000. "Abnormal perinatal stimulation and long-term behavioral effects."

Grand Rounds, Department of Surgery, University of Tennessee and Le Bonheur Children's Hospital, Memphis, TN, May, 2000. "Analgesia and sedation in the newborn: Physiology and Pharmacology."

Grand Rounds Presentation, Department of Pediatrics, Lutheran General Hospital, Park Ridge, IL, May, 2000. "Long-term effects of pain in neonates".

I.C.U. Fellows Seminar, Department of Pediatrics, Lutheran General Children's Hospital, Park Ridge, IL, May, 2000. "Issues related to analgesia and sedation in critically ill children."

Residents' Seminar, Departments of Pediatrics and Emergency Medicine, Lutheran General Children's Hospital, Park Ridge, IL, May, 2000. "Analgesia and sedation in neonates."

Arkansas Caduceus Club Scientific Session; 32<sup>nd</sup> Annual Alumni Weekend, University of Arkansas for Medical Sciences, Little Rock AR, June, 2000. "Do Perinatal Events Affect Subsequent Behavior?"

St. Peter's Hospital Chertsey, and The European Institute of Health and Medical Sciences at the University of Surrey, Chertsey, Surrey, U.K., June, 2000. Public Lecture: "Of needles, tubes, and prematurity: What happens to the baby?"

Regional Meeting, Committee for the Future, ACH Foundation, Little Rock, AR, August, 2000. "Recent research in the Pain Neurobiology Laboratory".

Neonatology Seminar Series, Department of Pediatrics, University of Kentucky Children's Hospital, Lexington, KY, October, 2000. "Of needles, tubes, and prematurity: What happens to the baby?"

Neonatal-Perinatal Medicine Seminars, Department of Pediatrics and Department of Obstetrics & Gynecology, University of North Carolina at Chapel Hill and Wake Medical Center, Raleigh NC, October, 2000. "Of needles, tubes, and prematurity: What happens to the baby?"

Fall Seminar Series, Department of Pharmacology, University of Arkansas for Medical Sciences, Little Rock, AR, November, 2000. "Pain mechanisms during development".

**2001**

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30<sup>th</sup> International Scientific Symposium, Society for Critical Care Medicine, Current Concepts of Pediatric Critical Care Course, San Francisco CA, February, 2001. “Mechanisms and therapies for opioid tolerance and withdrawal”.

10<sup>th</sup> Annual Symposium on Neonatal-Perinatal Medicine, University of Michigan, Ann Arbor, MI, April, 2001. Keynote Address: “Long-term effects of pain in neonates, infants, and children.”

10<sup>th</sup> Annual Symposium on Neonatal-Perinatal Medicine, University of Michigan, Ann Arbor, MI, April, 2001. “Guidelines for the management of neonatal pain.”

10<sup>th</sup> Annual Symposium on Neonatal-Perinatal Medicine, University of Michigan, Ann Arbor, MI, April, 2001. Pro-Con Debate: “This house believes that exposure to pain causes detrimental effects on the clinical outcomes of preterm neonates.”

Joint Annual Meeting of the Pediatric Academic Societies, Special Interest Group for Pain in Children, Baltimore, MD, April, 2001. “Neonatal pain and acute clinical outcomes.”

Joint Annual Meeting of the Pediatric Academic Societies, Special Interest Group for Pain in Children, Baltimore, MD, April, 2001. “Evidence-based guidelines for neonatal pain management.”

14<sup>th</sup> Annual Meeting of the Canadian Pain Society, Education Day Workshop, Montreal, Canada, May, 2001. “Pain, plasticity, and preterm birth: a prescription for permanent suffering?”

14<sup>th</sup> Annual Meeting of the Canadian Pain Society, Symposium on Pediatric Pain, Montreal, Canada, May, 2001. “Update on Pediatric Pain.”

8<sup>th</sup> Annual Neonatology Symposium, University of Wisconsin and North Central Neonatology Group, Lake Geneva, Wisconsin, June, 2001. "Development of Neonatal Pain Processing"

8<sup>th</sup> Annual Neonatology Symposium, University of Wisconsin and North Central Neonatology Group, Lake Geneva, Wisconsin, June, 2001. “Management of pain in the neonate: Current practices & novel options”

Swedish Neonatal/Perinatal Medicine Seminars, Karolinska Hospital and Astrid Lindgren’s Children’s Hospital, Stockholm, Sweden, June, 2001. “Neuronal effects of Repetitive Pain in Neonates: Why do ex-preterm children have poor cognitive outcomes?”

2<sup>nd</sup> Nordic Congress on Pain in Children, Stockholm, Sweden. Plenary lecture, September, 2001. "Does repetitive pain damage the developing brain?"

2<sup>nd</sup> Nordic Congress on Pain in Children, Stockholm, Sweden. Mini-symposium on Pediatric Pharmacology, September, 2001. “Clinical Pharmacology of Opioids.”

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2<sup>nd</sup> Nordic Congress on Pain in Children, Stockholm, Sweden, September, 2001. Symposium on Management of Neonatal Pain, “Pharmacological approaches to pain management.”

NIMH-Sponsored Network, Annual Symposium, Early Experience and Stress: Before and After the First Breath, University of Michigan, Ann Arbor, MI, October, 2001. "Early repetitive pain: is there evidence for global neurodevelopmental effects?"

2001 National Conference and Exhibition, American Academy of Pediatrics, San Francisco CA, October, 2001. "Evidence-based Guidelines for Pain Management in the Newborn" (2hr seminar) 9:30am and again at 1:30pm.

XVII Brazilian Congress of Perinatology, Brazilian Association of Pediatrics, Florianopolis, Brazil, November, 2001. “Update in neonatal sedation.”

XVII Brazilian Congress of Perinatology, Brazilian Association of Pediatrics, Florianopolis, Brazil, November, 2001. “Long-term effects of pain in the neonate”.

XVII Brazilian Congress of Perinatology, Brazilian Association of Pediatrics, Florianopolis, Brazil, November, 2001. “Importance of Pain in the Neonatal Period ”

XVII Brazilian Congress of Perinatology, Brazilian Association of Pediatrics, Florianopolis, Brazil, November, 2001. “Pharmacological Treatment of Pain in the Neonatal Period ”.

Investiture Ceremony, Morris & Hettie Oakley Endowed Chair of Pediatric Critical Care, Department of Pediatrics, University of Arkansas for Medical Sciences, Little Rock, AR; April, 2001. “Love, Pain and Care: as the Golden Age of Pediatrics dawns....”

Department of Anatomy and Neurobiology, University of Arkansas for Medical Sciences, Faculty Interactive Seminars, August, 2001. “Repetitive pain and neuronal cell death: evidence for global neurodevelopmental effects.”

Anesthesiology Research Seminars, Department of Anesthesiology and Critical Care Medicine, Children’s Hospital and Harvard Medical School, Boston, MA, August, 2001. “Why do ex-preterm children have poor cognitive outcomes?”

Faculty Research Conference, Department of Pediatrics, University of Arkansas for Medical Sciences, Arkansas Children’s Hospital Research Institute, November, 2001. “Does repetitive neonatal pain cause brain damage?”

Neuropharmacology Graduate Course, Department of Pharmacology and Toxicology, University of Arkansas for Medical Sciences, December, 2001. “Pain management.”

PICU Residents Lecture, Department of Pediatrics, University of Arkansas for Medical Sciences, Arkansas Children’s Hospital (January through December, 2001 monthly lecture series). “Sedation and analgesia in critically ill patients.”



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**2002**

21<sup>st</sup> Annual Scientific Meeting of the American Pain Society, Symposium on “Changing the Face of Pediatric Pain”, Workshop Session: Present State and Future Directions of Pediatric Pain Research, March, 2002, Baltimore MD. “Experimental models for neonatal pain research.”

NIC/Q 2002, Annual Meeting of the Vermont-Oxford Neonatal Network, New Orleans, LA, April, 2002. Keynote Address: “Neurobiology of neonatal pain as a foundation for clinical practice.”

PAS Annual Meeting 2002, State-of-the-Art Plenary Session on Pediatric Pain, Baltimore MD, May, 2002. “Pain, Plasticity, and preterm birth: Findings from the bench & bedside”.

18<sup>th</sup> European Congress of Perinatal Medicine, June, 2002; Plenary Session on Neonatal Pain, Oslo, Norway. “Prevention and management of pain in the newborn.”

28<sup>th</sup> Annual Congress, German Society of Neonatology and Pediatric Intensive Care, June, 2002; Plenary Session on Neurology and Neurointensive Care, Mainz, Germany. "Long-term effects of repetitive pain or prolonged analgesia in preterm neonates."

28<sup>th</sup> Annual Congress, German Society of Neonatology and Pediatric Intensive Care, June, 2002; Plenary Session of the Nursing Track, Mainz, Germany. “Neonatal pain and acute clinical outcomes.”

4<sup>th</sup> International Forum on Pediatric Pain, September, 2002, White Point Beach, Nova Scotia. Keynote Speaker: “Experimental models of pain and early adverse experience”.

NIC/Q 2002, Fall Meeting of the Vermont-Oxford Network, September, 2002, Chicago, IL. “Potentially better practices for neonatal analgesia”.

NIC/Q 2002, Fall Meeting of the Vermont-Oxford Network, September, 2002, Chicago, IL. “Role of sucrose in neonatal pain management”.

International IPOKRaTES Seminar on "Neonatal Comfort and Care" October, 2002, Gmunden, Austria. “Mechanisms of pain in the fetus and neonate”

International IPOKRaTES Seminar on "Neonatal Comfort and Care" October, 2002, Gmunden, Austria. “Long-term effects of repetitive pain in the neonate”

International IPOKRaTES Seminar on "Neonatal Comfort and Care" October , 2002, Gmunden, Austria. “Does the ventilated premature infant require routine analgesia?”

International IPOKRaTES Seminar on "Neonatal Comfort and Care" October , 2002, Gmunden, Austria. “Management of pain in the neonate: Current practice and novel approaches”.

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Dean's Research Forum, University of Arkansas for Medical Sciences, October, 2002, Little Rock, AR. "Pain, plasticity, prematurity: findings from the bench and the bedside".

8<sup>th</sup> Biennial Congress, European Society for Developmental Pharmacology, October, 2002. Liège, Belgium. Plenary Lecture: "Effects of perinatal pain and stress: a pharmacological approach."

8<sup>th</sup> Biennial Congress, European Society for Developmental Pharmacology, October 2002. Liège, Belgium. Moderator: "Pain in children: where are we in terms of assessment and management?"

12<sup>th</sup> Jackson Rees International Symposium on *Pain in Children: The Next Step*, Academisch Ziekenhuis Rotterdam, Erasmus University and Sophia Children's Hospital, October, 2002, Rotterdam, The Netherlands. "Pain in Neonates: Where are we going?"

20<sup>th</sup> Neonatal Course for Senior Paediatricians, Imperial College of Medicine, November, 2002, London, England. The Lesley Cooper Memorial Lecture: "Neonatal pain."

Arkansas Children's Hospital Auxiliary Officers Meeting, Little Rock, January, 2002. "Research directions on pain in children at ACHRI".

Invited Lecturer, Saturday Open Forum, Unitarian Universalist Church of Little Rock, January, 2002. "Universal principles from Sikhism and other religions".

Students Forum, Hendrix College, Conway, AR. January, 2002. "Death and Dying: Before and After".

Grand Rounds, Department of Anesthesiology, Wayne State University, Children's Hospital of Michigan, Detroit, MI. June, 2002. "Opioid analgesia in the neonate: bench research and clinical trials."

PICU Fellows Research Conference, Departments of Pediatrics and Pharmacology, Wayne State University, Children's Hospital of Michigan, Detroit, MI. June, 2002. "The anatomy and physiology of a research project".

Grand Rounds, College of Pharmacy and Pharmaceutical Sciences, Wayne State University, Detroit, MI. June, 2002. "Neonatal pain management: physiological effects and clinical outcomes".

Neonatal ICU Seminars, , Department of Pediatrics, Wayne State University, Children's Hospital of Michigan, Detroit, MI. June, 2002. "Does routine analgesia alter clinical outcomes?"

Case Discussion Seminar, Pediatric Pain Interest Group, Departments of Pediatrics, Anesthesiology, and Pharmacy, Wayne State University, Children's Hospital of Michigan, Detroit, MI. June, 2002. "Systematic approach for the management of chronic pain patients".

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Grand Rounds, Department of Pharmacology, Wayne State University, Children's Hospital of Michigan, Detroit, MI. June, 2002. "Opioid Tolerance and Withdrawal: mechanisms and novel therapies".

Grand Rounds, Department of Pediatrics, Wayne State University, Children's Hospital of Michigan, Detroit, MI. June, 2002. "Pain, plasticity, and prematurity: What happens to the baby?"

Arkansas Colleges and University Representatives, Rhodes Scholarships Selection Committee, Arkansas Children's Hospital, August, 2002, Little Rock, AR. "Selection criteria and preparation for the Rhodes Scholarship Interviews".

Pediatric Grand Rounds, Children's Medical Center, University of Texas Southwestern Medical School, September, 2002, Dallas, TX. "Management of pain and distress caused by invasive procedures in neonates and children"

Clinical Grand Rounds, Children's Medical Center, University of Texas Southwestern Medical School, September, 2002, Dallas, TX. "Long-term effects of repetitive pain in neonates".

Division of Neonatology Research Conference, Parkland Memorial Hospital, University of Texas Southwestern Medical School, September, 2002, Dallas, TX. "Does the ventilated preterm neonate require analgesia routinely? Results from the NOPAIN and NEOPAIN Trials".

Dinner Speaker, Department of Pediatrics, Children's Medical Center, University of Texas Southwestern Medical School, September, 2002, Dallas, TX. "Outcomes of premature birth: What's happening in school?"

Pediatric Grand Rounds, Medical City Dallas-North Texas Hospital for Children, September, 2002, Dallas, TX. "Management of procedural and postoperative pain in neonates".

Neonatal ICU Seminars, Medical City Dallas-North Texas Hospital for Children, September, 2002, Dallas, TX. "Opioid tolerance and strategies for preventing opioid withdrawal".

Medical Staff Meeting, Medical City Dallas-North Texas Hospital for Children, September, 2002, Dallas, TX. "Long-term effects of pain in the neonatal period".

Pediatric Grand Rounds, Departments of Pediatrics, Obstetrics and Gynecology, Presbyterian Hospital of Dallas, September, 2002, Dallas, TX. "Neonatal and infant pain: Current therapies and novel options".

Neonatal ICU Seminars, Department of Pediatrics, Presbyterian Hospital of Dallas, September, 2002, Dallas, TX. "Long-term effects of neonatal pain".

Medical Staff Monthly Conference, Presbyterian Hospital of Dallas, September, 2002, Dallas, TX. "Does the ventilated preterm neonate require analgesia routinely?"

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Resident's Seminar Series, UAMS Department of Pediatrics, September, 2002, Little Rock, AR. "Death and Dying: Management of Terminal Illness"

Faculty Research Conference, Arkansas Children's Hospital Research Institute, September, 2002, Little Rock, AR. "Does gastric suctioning at birth increase long-term risk for functional intestinal disorders in adulthood?"

College of Medicine, Dean's Research Forum, University of Arkansas for Medical Sciences, October, 2002, Little Rock, AR. "Pain, plasticity, prematurity: findings from the bench and the bedside".

Neurotoxicology Grand Rounds, National Center for Toxicological Research, December, 2002, Jefferson, AR. "The Science of Neonatal Pain: Short-term and Long-term Neurodevelopmental effects".

### **2003**

25<sup>th</sup> Annual "Management of the Tiny Baby" Conference, January, 2003, Orlando, Florida. "The Science of Neonatal Pain: Short-term and Long-term Neurodevelopmental Effects"

25<sup>th</sup> Annual "Management of the Tiny Baby" Conference, January, 2003, Orlando, Florida. "Neonatal Pain Management: The Art and the Medicine".

NICHD/FDA Planning Meeting, Newborn Drug Development Initiative, Best Pharmaceuticals for Children Act, February, 2003; Baltimore, MD. "Goals for the Anesthesia/Analgesia Task Force".

Annual Meeting, Child Health Accountability Initiative (CHAI), March, 2003, St. Louis, MO. "State-of-the-Art and Science of Neonatal Pain Management".

The Diamond Conference, May, 2003, Little Rock, AR. "What happens in the premature baby's brain when invasive medical procedures are performed without any pain relief?"

International IPOKRaTES Seminar on "Neonatal Comfort and Care" June, 2003, Padova, Italy. "Mechanisms of pain in the fetus and neonate"

International IPOKRaTES Seminar on "Neonatal Comfort and Care" June, 2003, Padova, Italy. "Long-term effects of repetitive pain in the neonate"

International IPOKRaTES Seminar on "Neonatal Comfort and Care" June, 2003, Padova, Italy. "Does the ventilated premature infant require routine analgesia?"

International IPOKRaTES Seminar on "Neonatal Comfort and Care" June, 2003, Padova, Italy. "Management of pain in the neonate: Current practice and novel approaches".

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2<sup>nd</sup> International EURAIBI (Europe Against Infant Brain Injury) Workshop, June, 2003, Siena, Italy. Honorary Keynote Address: “Long-term effects of pain in the developing brain” (live broadcast of opening ceremony to 125 countries by Reuters International).

4<sup>th</sup> World Congress on Pediatric Intensive Care, World Federation of Pediatric Intensive and Critical Care Societies, June, 2003, Boston, MA. “Mechanisms of Pain: Immediate & long-term effects in critical illness”.

4<sup>th</sup> World Congress on Pediatric Intensive Care, World Federation of Pediatric Intensive and Critical Care Societies, June, 2003, Boston, MA. “Opioid tolerance and withdrawal: Novel strategies for prevention”.

4<sup>th</sup> World Congress on Pediatric Intensive Care, World Federation of Pediatric Intensive and Critical Care Societies, June, 2003, Boston, MA. Pro/Con Debate: “Sedation is not required for mechanically ventilated children”.

4<sup>th</sup> World Congress on Pediatric Intensive Care, World Federation of Pediatric Intensive and Critical Care Societies, June, 2003, Boston, MA. “Management of pain and stress in neonates”.  
34<sup>th</sup> Annual Meeting of the Perinatal Research Society, September, 2003, Charleston, South Carolina. Keynote Address: “Long-term Effects of Repetitive Pain and Analgesia in Neonates”.

9<sup>th</sup> Annual Vanderbilt Neonatology Symposium, Neonatal/Perinatal Section, Vanderbilt University, October, 2003, Nashville, TN. “Repetitive pain or prolonged analgesia: Who is the greater enemy?”

9<sup>th</sup> Annual Vanderbilt Neonatology Symposium, Neonatal/Perinatal Section, Vanderbilt University, October, 2003, Nashville, TN. “Of needles, tubes, and prematurity: What happens to the baby?”

National Conference & Exhibition 2003, American Academy of Pediatrics, Sections of Critical Care, Home Health and Perinatal Pediatrics, American Academy of Pediatrics, October, 2003, New Orleans, LA. “Pain Palliation and the Long Term Effects of Early Pain Experience in Infants and Young Children”

National Conference & Exhibition 2003, American Academy of Pediatrics, October, 2003, New Orleans, LA. Plenary Lecture, Section of Perinatal Pediatrics: “Repetitive Pain or Neonatal Analgesia: Who is the greater enemy?”

FDA and NIH Joint Working Group, Newborn Drug Development Initiative, February, 2003, Baltimore, MD. “Future directions for neonatal analgesia and sedations”.

Neonatology Research Conference, Baylor University and Texas Children’s Hospital, February, 2003, Houston, TX. “Does the Newborn Brain Process Pain at the Supraspinal Levels?”



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Physiology Conference, Departments of Pediatrics, Anesthesiology, and Neonatal/Pediatric Nursing, Baylor University and Texas Children's Hospital, February, 2003, Houston, TX. "Analgesia and Sedation in the Critically Ill Neonate".

Newborn Center Pain Committee, Department of Pediatrics and Anesthesiology, Baylor University and Texas Children's Hospital, February, 2003, Houston, TX. "Review of Pain Pocket Guidelines for Procedural Pain in Neonates".

Division of Neonatology, Department of Pediatrics, Baylor University and Texas Children's Hospital, February, 2003, Houston, TX. "Case studies in neonatal pain management".

Nursing Research Scholars & Fellows, Baylor University School of Nursing and Texas Children's Hospital, February, 2003, Houston, TX. "Developing a Program of Research"

Pain Quality Improvement Committee, Department of Pediatrics, Nursing and Pharmacy, Texas Children's Hospital, February, 2003, Houston, TX. "Assessing Quality Improvement Outcomes in Pain Management: Past, Present, & Future"

Residents' Noon Lecture Series, Department of Pediatrics, Nursing and Pharmacy, Texas Children's Hospital, February, 2003, Houston, TX. "Opioid Tolerance and Dependence in Neonates: Mechanisms, Diagnosis, Assessment & Management".

Newborn Center Pain Committee, Department of Pediatrics, Baylor University and Texas Children's Hospital, February, 2003, Houston, TX. "Guidelines for opioid weaning".

Pediatric Pain Workshop, Department of Pediatrics and Anesthesiology, Baylor University and Texas Children's Hospital, February, 2003, Houston, TX. "Local, Regional and Topical Analgesia Techniques for Procedural Pain in the Neonate".

Neonatology Fellows Conference, Department of Pediatrics, Baylor University and Texas Children's Hospital, February, 2003, Houston, TX. "Managing chronic pain in neonates requiring prolonged hospitalization".

Arnold J. Rudolph Memorial Grand Rounds, Department of Pediatrics, Baylor University and Texas Children's Hospital, February, 2003, Houston, TX. "Long-term effects of repetitive pain in preterm neonates".

Neonatology Fellows Conference, Department of Pediatrics, Baylor University and Texas Children's Hospital, February, 2003, Houston, TX. "Neurologic Outcomes & Pre-emptive Analgesia in Neonates: The NEOPAIN Multicenter Trial".

Residents Noon Conference, Department of Pediatrics, Baylor University and Texas Children's Hospital, February, 2003, Houston, TX. "End-of-Life Decisions in the NICU: Medical Infanticide or Palliative Terminal Care?"

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Introduction to Clinical Medicine, UAMS College of Medicine, March, 2003, Little Rock, AR. “Cultural diversity and ethical challenges in medical decision-making”.

Fellows Research Conference, CCM Section, UAMS Department of Pediatrics and Arkansas Children’s Hospital, March, 2003, Little Rock, AR. “Neonatal pain research: an update”.

Fellows Teaching Conference, CCM Section, UAMS Department of Pediatrics and Arkansas Children’s Hospital, March, 2003, Little Rock, AR. “Fluid and electrolyte problems in the Pediatric ICU.”

Pediatric Grand Rounds, St. Jude’s Children’s Hospital and Research Center, May, 2003, Memphis, TN. “Long-term effects of repetitive neonatal pain”.

Course Director, *“The Cutting Edge of Pediatric Intensive Care”*, Arkansas Children’s Hospital and UAMS Department of Pediatrics, March, 2003, Little Rock, AR.

Pediatric Grand Rounds, UAMS Department of Pediatrics and Arkansas Children’s Hospital, August, 2003, Little Rock, AR. “Final results from the NEOPAIN Multicenter Trial”.

Mid-Central Region Mini-Conference, Sri Sathya Sai Baba Center of Kansas City, October, 2003, Kansas City, MO. “Pathways to Self-Realization.”

Critical Care Medicine Research Conference, University of Pittsburgh and Children’s Hospital of Pittsburgh. October, 2003. “Repetitive Pain and Ketamine Analgesia: Neurotoxic or Neuroprotective?”

Meet the Professor Session, Department of Critical Care Medicine, University of Pittsburgh, October, 2003. “A research career in academic medicine.”

Pediatric Anesthesia Grand Rounds, University of Pittsburgh and Children’s Hospital of Pittsburgh. October, 2003. “Opioid Tolerance and Withdrawal: Mechanisms and Novel Therapies”

Critical Care Medicine Grand Rounds, Department of Critical Care Medicine, University of Pittsburgh, October, 2003. “Of needles, tubes and prematurity: What happens when babies grow up?”

ACHRI President Recruitment Seminar, Arkansas Children’s Hospital, November, 2003, Little Rock, AR. “Repetitive pain or prolonged analgesia in neonates: Who is the greater enemy?”

Grand Rounds, Departments of Pediatrics and Anesthesiology, Children’s Hospital of New Jersey (Newark Beth Israel Medical Center), December, 2003, Newark, NJ. “Long-term Effects of Repetitive Pain in Neonates.”

Neonatology Seminars for Residents, Department of Pediatrics, Children’s Hospital of New Jersey (Newark Beth Israel Medical Center), December, 2003, Newark, NJ. “Practical management of pain and sedation in neonates.”

**2004**

10<sup>th</sup> Annual Conference of the Indian Society of Critical Care Medicine, Indian Society of Critical Care Medicine, February, 2004, Mumbai, India. “Pain management in the Pediatric ICU.”

Keynote Address at UNESCO 2004 Congress, “La douleur de l’enfant: Quelles réponses?”, February, 2004, Paris, France. “Morphine for ventilated preterm neonates: Results of the NEOPAIN Study”

10<sup>th</sup> Annual Conference, “Current Topics and Controversies in Perinatal & Neonatal Medicine”, California Association of Neonatology, San Diego CA, February, 2004. “Pharmacology and pain management in neonates.”

10<sup>th</sup> Annual Conference Current Topics and Controversies in Perinatal and Neonatal Medicine, California Association of Neonatology, February, 2004, Coronado, CA.  
“Pain management in the neonate and the care of the terminally ill infant”.

3<sup>rd</sup> Meeting, Maternal-Fetal NIMH Network: Development of Interdisciplinary Approaches to Study the Impact of Adverse Fetal and Neonatal Experience on Child and Adolescent Mental Health, University of Michigan, March, 2004, Ann Arbor, MI. “Pain and stress in the newborn rat: A model for long-term cognitive outcomes?”

FDA/NICHD Newborn Drug Development Initiative Workshop, March, 2004; Baltimore, MD.  
Plenary lecture: “Overview of the progress by the Neonatal Pain Task Force”.

FDA/NICHD Newborn Drug Development Initiative Workshop, March, 2004; Baltimore, MD.  
Plenary lecture: “Potential Trial Designs for Neonatal Pain studies”.

FDA/NICHD Newborn Drug Development Initiative Workshop, March, 2004; Baltimore, MD.  
“Sample trial designs for procedural pain studies in neonates.”

8<sup>th</sup> Spring Meeting, Royal College of Paediatrics and Child Health, University of York, York (UK), March, 2004. Windermere Honorary Lecture: “Love, Pain and Neonatal Care”.

3<sup>rd</sup> Nordic Congress on Children and Pain, The Swedish Paediatric Pain Society, May, 2004, Linköping, Sweden. Keynote Address: “Love, Pain and Care: Effects on brain development and clinical outcomes”.

4<sup>th</sup> Annual Neonatal Pharmacology Conference sponsored by Contemporary Forums, May, 2004, Chicago, IL. “Evidence-Based Management of Pain in Neonates”.

X<sup>th</sup> International Postgraduate Course in Neonatal Intensive Care, May, 2004, Buenos Aires, Argentina. “Management of Pain in the Neonate: Current Practice Recommendations”.

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X<sup>th</sup> International Postgraduate Course in Neonatal Intensive Care, May, 2004, Buenos Aires, Argentina. “Of needles, tubes, and prematurity: What happens to the baby?”

X<sup>th</sup> International Postgraduate Course in Neonatal Intensive Care, May, 2004, Buenos Aires, Argentina. “Does the Ventilated Premature Infant Require Routine Analgesia?”

Neonatal Update 2004, University of Massachusetts Medical Center, June, 2004, Marlboro, MA. “Of Needles, Tubes and Prematurity – What happens to the baby?”

Maternal-Fetal Network Meeting, The British Columbia Research Institute for Children’s and Women’s Health, University of British Columbia, September, 2004, Vancouver, British Columbia. “Update on neonatal pain research.”

21<sup>st</sup> Annual NOGAN Lecture, Association of Georgia Neonatologists, Atlanta, GA; December, 2004. “Management of pain in preterm neonates: lessons from the NEOPAIN Trial”.

Presentation to the Chief Minister, Health Minister and Administrative Secretaries of Delhi State, January, 2004. “Proposal for a specialized Pediatric health care system”.

Visiting Professor Rounds, Department of Pediatrics, All-India Institute of Medical Sciences, New Delhi, February, 2004. “Neonatal pain and stress”

Neonatology Seminars, Department of Paediatrics and the Simpson Maternity Pavilion, University of Edinburgh, Edinburgh, April, 2004. “Research design and interpretation of preliminary data.”

Neuroscience Course (M1 Medical Students; Course Director – Dr. Robert D. Skinner), The Department of Neurobiology and Developmental Sciences, University of Arkansas for Medical Sciences, April, 2004. “The Anatomy and Physiology of Pain”.

NIH Grant Review for Dr. Pao-Feng Tsai (Education Building III (COPH building) Room # 5231), UAMS School of Nursing, August, 2004.

Research Seminars, Departments of Pediatrics and Pharmacology, University of California at San Diego, College of Medicine and College of Pharmacy, San Diego, November, 2004. “Repetitive pain or prolonged analgesia in neonates: Which is the lesser evil?”

Monthly Lecture Series, Pain Arkansas! Club at University of Arkansas for Medical Sciences, October, 2004. “Novel approaches to the blockade of opioid tolerance”.

Grand Rounds, Departments of Pediatrics and Pharmacology, University of California at San Diego, November, 2004. “Long-term effects of pain in neonates”.

Pediatric Resident Mock Codes, Department of Pediatrics, University of Arkansas for Medical Sciences, November, 2004. “CPR in pediatric patients”.

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CME Lecture for Advanced Pediatric Nurses, Pediatric Intensive Care Unit, Arkansas Children's Hospital, December, 2004. "Analgesia and sedation in PICU patients".

Neuropharmacology Course (PCOL 5133; Course Director – Dr. Galen R. Wenger), Department of Pharmacology & Toxicology, University of Arkansas for Medical Sciences, December, 2004. "The Pharmacological Control of Pain".

Grand Rounds, Department of Pediatrics, Emory University School of Medicine and Children's Health Care of Atlanta at Eggleston, December, 2004. "Effects of repetitive pain in the development of preterm neonates".

Neonatology Noon Lectures, Department of Pediatrics, Emory University School of Medicine and Grady Memorial Hospital, Atlanta, GA; December, 2004. "Novel research on neonatal pain."

Emergency Medicine Seminars, Department of Pediatrics and Emergency Medicine, Children's HealthCare of Atlanta, Atlanta, GA; December, 2004. "Acute Pain Management for Invasive Procedures in the Emergency Room."

## **2005**

Plenary Speaker, 25th Anniversary of IPOKRaTES Seminars, New Frontiers in Neonatology: A Global Forum for Research and Science; March, 2005; Innsbruck, Austria. "The impact of repetitive pain on the developing brain".

Plenary Speaker, 2<sup>nd</sup> International IDNIC Conference "Infant Development in Neonatal Intensive Care", March, 2005; London, U.K. "Consequences of painful experiences during neonatal intensive care".

24<sup>th</sup> Annual Scientific Meeting of the American Pain Society, March, 2005; Boston, MA; Pediatric Pain Forum on "Pediatric Drug Development – A Regulatory Perspective", invited lecture: "Neonatal Pain Management: Current research and Future directions"

24<sup>th</sup> Annual Scientific Meeting of the American Pain Society, March, 2005; Boston, MA; Workshop on "Infant Pain: Sharpening our understanding within critical stages of Infant Development", invited lecture: "Acute Pain in Preterm Neonates".

Annual Meeting of the Pediatric Academic Societies', May, 2005; San Francisco, CA. Moderator for the Brain Injury Poster Symposium Session.

11th World Congress on Pain, Workshop on "Nationwide guidelines on pain in children: Development and implementation in different countries", August, 2005, Sydney, Australia. "Evidence Based Guidelines: Report from the NIH-FDA Neonatal Pain Control Group".



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11th World Congress on Pain, Chairman, Workshop on “Impact of Neonatal Pain on Subsequent Pain Processing, Pain Thresholds and Responses to Analgesia”, August, 2005, Sydney, Australia.

International Medical Conference on Sai Ideal Health Care, September, 2005, Prasanthi Nilayam, Puttaparthi (India). “Purity, Prema, and Prevention: The Pillars of Pediatric Care”.

5<sup>th</sup> National Neonatal Nurses Meeting, sponsored by Neonatal Network and The Academy of Neonatal Nursing, September, 2005; Chicago, IL. “Neonatal Pain: Clinical and Biological Relevance”

5<sup>th</sup> National Neonatal Nurses Meeting, sponsored by Neonatal Network and The Academy of Neonatal Nursing, September, 2005; Chicago, IL. “Ventilated Preterm Neonates: Analgesia, Sedation, or What?”

International Symposium on “The Neonatal Brain”, to celebrate 90 years of Kinderklinik Glanzing on October, 2005 in Vienna, Austria. “Repetitive Pain alters the Developing Brain”.

Symposium on “Developmental Neuroscience: Imaging the Fetal and Newborn Brain”, University of Arkansas for Medical Sciences, October, 2005. “Pain in the Fetus and Newborn: Cortical and subcortical processing?”

House Judiciary Subcommittee on the Constitution, Congress of the United States House of Representatives, November, 2005, Washington, DC. Presenting “Expert Testimony on Pain of the Unborn”.

Keynote Speaker, Dr. Martin Luther King, Jr. Commemoration Day, University of Arkansas for Medical Sciences, University Chancellor’s Diversity Committee, January, 2005. “Dr. Martin Luther King, Mahatma Gandhi and a Theory of Human Relativity”.

Monthly Lecture Series, Pain Arkansas! Club at University of Arkansas for Medical Sciences, January, 2005. “Neuroimaging and neonatal pain”.

Physician ECMO Training and Refresher Course, UAMS Department of Pediatrics, UAMS Office of Continuing Education, and Arkansas Children’s Hospital; February, 2005; Little Rock, AR. “Sedation and Analgesia in ECLS Support”.

Research Competition Judge, 11<sup>th</sup> Annual Residents’ Day, Department of Anesthesiology, University of Arkansas for Medical Sciences, February, 2005; Little Rock, AR.

Anesthesiology Grand Rounds, Department of Anesthesiology, Baylor University School of Medicine and Texas Children’s Hospital, March, 2005; Houston, TX. “Neurodevelopmental effects of sedative, analgesic, and anesthetic drugs”.

Neonatology/Critical Care Medicine Joint Seminars, Department of Pediatrics, Baylor University School of Medicine and Texas Children’s Hospital, March, 2005; Houston, TX. “Management of Pain in the neonate: Current practice and novel options”.

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Anesthesiology Fellows Conference, Department of Anesthesiology, Baylor University School of Medicine and Texas Children's Hospital, March, 2005; Houston, TX. "Prediction of clinical outcomes in pediatric surgical patients".

**John S. Liebeskind Visiting Professorship**, Grand Rounds, UCLA Department of Pediatrics, Harbour-UCLA Medical Center, April, 2005. "Repetitive pain vs. prolonged analgesia: Which is the lesser evil?"

**John S. Liebeskind Visiting Professorship**, UCLA Faculty Club, Departments of Pediatrics, Medicine, Psychology, History, Sociology, Anthropology, University of California at Los Angeles, April, 2005. "Pain and the Brain: unifying roles in Evolution and Human Development".

Fellows Conference, Critical Care Medicine Section, Department of Pediatrics, University of Arkansas for Medical Sciences, September, 2005; Little Rock, AR. "Future models of health care delivery: report from the International Sai Medical Conference".

**Gregory Mark Taubin Distinguished Lecturer**, Department of Pediatrics, Children's National Medical Center, GW University School of Medicine, December, 2005; Washington DC. "Pain and stress in critically ill pediatric patients".

Grand Rounds, Department of Pediatrics, New York University School of Medicine & NYU Medical Center, December, 2005; New York, NY. "Prematurity, pain management, and brain plasticity: Developmental origins of adult behavior?"

## 2006

NICU-PICU Specialty Conference, Pediatric Pharmacy Advocacy Group, March, 2006, Baltimore, MD. **Keynote Address**: "Pain Management in Neonatal and Pediatric Patients."

Pediatric Academic Societies' Annual Meeting, San Francisco, CA, April, 2006. Workshop on CPCCRN: The NICHD Collaborative Pediatric Critical Care Research Network: "Towards Evidence-Based Management of Sedation in Pediatric Critical Care".

12<sup>th</sup> Annual Ruth Rappaport Seminar on Pediatric Pain Management: "Facing The Future". The Technion: Israel Institute of Technology, Haifa, Israel, June, 2006. **Honorary Guest Lecture**: "Consciousness, behavior, and clinical impact of the definition of pain".

12<sup>th</sup> Annual Ruth Rappaport Seminar on Pediatric Pain Management: "Facing The Future". The Technion: Israel Institute of Technology, Haifa, Israel, June, 2006. "Evidence based treatment of neonatal pain".

Annenberg Center for Health Sciences, 3<sup>rd</sup> Annual Meeting, Evidence vs. Experience in Neonatal Practices, Boston MA, June, 2006. "Pharmacological Management of Pain and Sedation in the NICU"

CIHR Pain in Child Health Summer 2006 Institute, Rockwater Cove, B.C., Canada, June, 2006. “The Stress of Early Surgery and its long term effects.”

7<sup>th</sup> International Symposium on Pediatric Pain, IASP Special Interest Group on Pain in Children, Vancouver, B.C., Canada, June, 2006. Workshop on Analgesic Drugs: Safety and Efficacy in Children; “Efficacy of Pharmacological Analgesia in Newborn Infants.”

CIHR Pain in Child Health Summer 2006 Institute, Rockwater Cove, B.C., Canada, June, 2006. “The most important challenges in pediatric pain”.

7<sup>th</sup> International Symposium on Pediatric Pain, IASP Special Interest Group on Pain in Children, Vancouver, B.C., Canada, June, 2006. Workshop on Pharmacogenomics of Analgesic Drugs: Sense or Nonsense? “Pharmacogenomics: The Bioethics Challenge of the 21st Century.”

7<sup>th</sup> International Symposium on Pediatric Pain, IASP Special Interest Group on Pain in Children, Vancouver, B.C., Canada, June, 2006. Chaired the Expert Panel Discussion on “Role of Drug Regulatory Agencies in the use and approval of analgesics in children”.

7<sup>th</sup> International Symposium on Pediatric Pain, IASP Special Interest Group on Pain in Children, Vancouver, B.C., Canada, June, 2006. Workshop on Development and Implementation of Evidence Based Guidelines on Pain in Children. “Evidence Based Guidelines: Report from the NIH-FDA Neonatal Pain Control Group”.

7<sup>th</sup> International Symposium on Pediatric Pain, IASP Special Interest Group on Pain in Children, Vancouver, B.C., Canada, June, 2006. **Plenary Podium Presentation:** “Childhood Analgesia: Getting off-label drugs on-label”.

International Symposium on “Emerging Trends in Biological and Chemical Sciences”, Department of Biosciences and Chemistry, Sri Sathya Sai Institute of Higher Learning (Deemed University) Prasanthi Nilayam (AP), India, August, 2006. **Plenary Podium Presentation:** “*Primum non dolore*: First, Cause No Pain”.

23<sup>rd</sup> International Neurotoxicology Conference, “Neurotoxicity in Development & Aging”, Little Rock, AR, September, 2006. B. Clancy, B. Kersh, K.J.S. Anand, et al. “What is that in rat days? A Web-Based Approach to the Translation of Neurodevelopmental Time across Mammalian Species”.

2006 Annual Meeting, Society for Pediatric Anesthesia, Chicago, IL, October, 2006. **Plenary Inaugural Address:** “Neurobiology of Acute Pain in Infants and Children”.

NIMH-funded Maternal-Fetal Network (Impact of Adverse Fetal and Neonatal Experience on Child and Adolescent Mental Health), University of Minneapolis, Center for Human Development, November, 2006. “A novel bioinformatics approach for translating developmental time across mammalian species”.

Annual BPCA Drug Prioritization Meeting, National Institute of Child Health and Human Development, National Institutes of Health, Bethesda, MD, December, 2006. “Update on BPCA-related Activities: Research Agenda for Neonatal Pain”.

**Pfizer Visiting Professorship in Pain Medicine**, University of Utah School of Medicine and School of Pharmacy, Salt Lake City, UT, January, 2006. Pediatric Grand Rounds: “Pain, plasticity and Prematurity: neonatal shadows on development”.

Pfizer Visiting Professorship in Pain Medicine, University of Utah School of Medicine and School of Pharmacy, Salt Lake City, UT, January, 2006. Pharmacology & Pharmaceuticals Grand Rounds: “Opioid tolerance and withdrawal: Mechanisms and novel therapies”.

Pfizer Visiting Professorship in Pain Medicine, University of Utah School of Medicine and School of Pharmacy, Salt Lake City, UT, January, 2006. Neonatal Fellowship Program Seminars. “Management of analgesia and sedation in neonates”.

Pfizer Visiting Professorship in Pain Medicine, University of Utah School of Medicine and School of Pharmacy, Salt Lake City UT, January, 2006. Pain Center Workshop, Department of Anesthesiology: “Role of the cortex in human consciousness and pain perception”.

Nursing Grand Rounds, Nursing Education Department, Arkansas Children’s Hospital, February 28<sup>th</sup>, 2006, Little Rock, AR. “Consent, Assent and Clinical Research in Children”

Grand Rounds, Department of Geriatrics, University of Arkansas for Medical Sciences, March 1<sup>st</sup>, 2006, Little Rock, AR. “Pain Management at the Two Ends of Life: Lessons from the Newborn”.

Visiting Scientist Seminars, National Center for Toxicological Research, Jefferson, AR; March, 2006. “Pain and stress in Laboratory Animals: Prevention, Assessment, and Management”.

Medical Students Block 10 Electives, UAMS College of Medicine, Reynolds Center for Aging, Little Rock, AR; March, 2006. “Inter-faith and cross-cultural issues for geriatric patients”.

Complementary and Alternative Medicine Course, Reynolds Center on Aging, Little Rock, AR, March, 2006. “Role of Spirituality in the Interpretation of Death and Dying”.

Clinton School of Public Service and University of Arkansas, Public Meeting at the William J. Clinton Presidential Center & Library, March, 2006. “Bridge to the Future: Role of Religion and Ethnicity in Building a Caring Community & Nation”.

Faculty Seminar Series, Department of Neurobiology & Developmental Sciences, UAMS College of Medicine, Little Rock, AR; April, 2006. “Consciousness without the Cortex: Neuroscience, Clinical Medicine, or Voodoo?”

Executive Presentation, Child Health Corporation of America, Kansas City, KS; April, 2006. “Participation in the NIH-funded CPCCRN Network studies for CHCA-affiliated hospitals”.

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UAMS College of Medicine, M2 Medical Students, September, 2006. Faculty for Patient Beliefs Panel Discussion (Moderated by Dr. James Graham).

NICU Grand Rounds, University of Western Ontario and St. Joseph's Hospital, London, Ontario, Canada; Tuesday, October, 2006. "Pain Management in the Neonate".

NICU Nursing Seminars, University of Western Ontario and St. Joseph's Hospital, London, Ontario, Canada; Tuesday, October, 2006. "Pain Assessment in the Neonate: New findings and their clinical application".

Visiting Scientist Program, Children's Hospital Research Institute, University of Western Ontario, London, Ontario, Canada, October, 2006. "Long-term Effects of Pain in Preterm Neonates".

Paediatric Grand Rounds, Children's Hospital of Western Ontario, University of Western Ontario, London, Ontario, Canada, October, 2006 "Mechanisms and Management of Opioid Tolerance in Children".

Pediatric Grand Rounds, Department of Pediatrics, Eastern Virginia Medical School and Children's Hospital of The King's Daughters, Norfolk, VA, October , 2006: "Management of pain in neonates: Current state-of-the-art".

Resident Noon Conference, Department of Pediatrics, Eastern Virginia Medical School and Children's Hospital of The King's Daughters, Norfolk, VA, October, 2006: "Long-term effects of medical and surgical procedures in preterm neonates".

Patient Care Seminars, Department of Surgery, Children's Hospital of The King's Daughters, Norfolk, VA, October, 2006: "Developing a practical neonatal pain management protocol".

NICU Nursing Professional Development Day, Children's Hospital of The King's Daughters, Norfolk, VA, October, 2006: "Pain Assessment in the Neonate: New findings and their clinical application".

Guest Speaker, Fortis Lt. Rajan Dhall Specialty Hospital, Vasant Kunj, New Delhi, India, November, 2006. "The advancement of Pediatric Care in India: Barriers and Solutions".

## 2007

4<sup>th</sup> International Conference on Children's Pain and Palliative Care, Vodafone Foundation Institute for Paediatric Pain Therapy and Paediatric Palliative Care and Dattel Children's Hospital, Recklinghausen, Germany, February, 2007. "Pain in Neonates: Assessment, management, long-term effects".

4<sup>th</sup> International Conference on Children's Pain and Palliative Care, Vodafone Foundation Institute for Paediatric Pain Therapy and Paediatric Palliative Care and Dattel Children's



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Hospital, Recklinghausen, Germany. February, 2007. “Meet the Expert session on Neonatal Pain”.

22<sup>nd</sup> Congress of the Indian Society of Study of Pain “ISSPCON 2007” at Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, India. Video conference on February, 2007. “Basic and neonatal science in relation to paediatric pain with implications of early pain experience on long term consequences”.

The Medical Home Model for Children after Life-Threatening Illness or Injury: A National Experts’ Conference, National Center for Medical Rehabilitation Research (NCMRR) at NICHD, American Academy of Pediatrics (AAP) and the Health Resources and Services Agency (HRSA), March, 2007 in Bethesda, MD. “Transition from PICU to the Home & Community: presentation of a new conceptual model”.

Open Public Hearing, Anesthesia and Life Support Drugs Advisory Committee, Division of Anesthesia, Analgesia and Rheumatology Products, Center for Drug Evaluation and Research, FDA, March, 2007, Baltimore MD. “Ketamine neurotoxicity in animal models should not alter its use in humans”.

17<sup>th</sup> Annual Neonatology Update, American Academy of Pediatrics (Chapter VII) and Northwestern University School of Medicine, June, 2007; Chicago IL. “Management of Pain in Neonates: an evidence-based approach”.

International Congress to commemorate the 50<sup>th</sup> Anniversary of the Rome Treaties: “The Human Being and the Problem of Pain” University of Tor Vergata, Rome, Italy, June, 2007. “Love, pain, and conscious perception in premature neonates”.

5<sup>th</sup> World Congress on Pediatric Critical Care, World Federation of Pediatric Intensive Care Societies, June, 2007, Geneva, Switzerland. Poster presentations: (a) Acupuncture reduces inflammatory hyperalgesia in newborn rats. (b) Neonatal pain alters adult cognitive performance & brain cytokine expression.

5<sup>th</sup> World Congress on Pediatric Critical Care, World Federation of Pediatric Intensive Care Societies, June, 2007, Geneva, Switzerland. Oral presentation: “Acupuncture reduces brain cell death following neonatal inflammatory pain.”

18<sup>th</sup> Annual NIDCAP Trainers Meeting, International Foundation for Developmental Care, September, 2007, Combrit, France. “Consciousness, Pain and Development in the Newborn.”

18<sup>th</sup> Annual NIDCAP Trainers Meeting, International Foundation for Developmental Care, September, 2007, Combrit, France. “Pain management and Development Care: Two sides of the same coin”.

14<sup>th</sup> Annual Father Joseph Biltz Awards Ceremony, Just Communities of Central Arkansas (formerly the NCCJ of Arkansas), October, 2007, Little Rock, AR. “Acceptance speech: Translating the message of love into our life”.

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Master of Pain Management, Module 8, Universitat Autònoma de Barcelona, October, 2007, Barcelona, Spain. “Conscious perception of Neonatal Pain and its Clinical Management.”

9<sup>th</sup> National Pediatric Critical Care Congress, Indian Society for Critical Care Medicine, New Delhi, India, November, 2007. Plenary Lecture: “Pain in Early Life: Science, Assessment, Management”.

Grant Review Sessions, Department of Neurobiology and Developmental Sciences, University of Arkansas for Medical Sciences, January, 2007. “Use of Acupuncture to Reduce Inflammatory Pain in Infants: A translational approach”.

Visiting Professor at Stanford University, Lucille Packard Children’s Hospital, Pediatric Pain Management & Pediatric Intensive Care Meeting, Thursday, February, 2007. “Novel therapies for management of opioid tolerance”.

Visiting Professor at Stanford University, Lucille Packard Children’s Hospital, Department of Anesthesiology Research Seminars, February, 2007. “Use of acupuncture in infancy: Results from an animal model”.

Visiting Professor at Stanford University, Lucille Packard Children’s Hospital, Pediatric Grand Rounds, February, 2007. “The Evidence for Fetal Pain: Clinical Medicine, Neuroscience, or Voodoo?”

Panel Discussion on “Spirituality in Medicine”, Course on Complementary and Alternative Medicine (CAM) for Senior Medical Students, University of Arkansas for Medical Sciences, March, 2007. “How does spirituality relate to religion? Answers from the Sikh Gurus and Sri Sathya Sai Baba”.

Core Curriculum Lectures, Pediatric Critical Care Medicine Fellowship Program, Department of Pediatrics, University of Arkansas for Medical Sciences, March, 2007. “Culturally Driven Management of Death and Dying”.

Fellow’s Research Conference, Pediatric Critical Care Medicine Fellowship Program, Department of Pediatrics, University of Arkansas for Medical Sciences, April, 2007. “The CRISIS Prevention Trial: rationale and training”.

Department of Pediatrics, University of Utah and CPCCRN Steering Committee Meeting, Park City, Utah, May, 2007. “The PROTAW Trial: Mini-protocol presentation”.

Department of Pediatrics, University of Utah and CPCCRN Steering Committee Meeting, Park City, Utah, May, 2007. “Psychological Outcomes of Critically Ill Children following PICU Admission”.

Neonatology Research Seminars, Karolinska Institute and Astrid Lindgren’s Children’s Hospital, Stockholm, Sweden, June, 2007. “Pain and its effects in the newborn: 20 years later”.

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Pediatric Grand Rounds, Escorts Heart Institute and Research Center, Fortis Healthcare Institute, New Delhi, India, August, 2007. “Pain in infancy: science, assessment, management.”

Pediatric Grand Rounds, Department of Pediatrics, All-India Institute of Medical Sciences, New Delhi, India, August, 2007. “Emerging approaches for neonatal pain management.”

Fellow's Conference, Department of Pediatrics, Critical Care Medicine Section, University of Arkansas for Medical Sciences, August, 2007: “Current Management of PICU Sedation/Analgesia”.

Anesthesiology Grant Rounds, Department of Anesthesiology & Critical Care Medicine, Harvard Medical School and Children's Hospital, Boston MA, October, 2007. “Pain in the Neonate and Fetus: 20 years later”.

Pediatric Grant Rounds, Department of Medicine, Harvard Medical School and Children's Hospital, Boston MA, October, 2007; “Pain in the Neonate and Fetus: current developments and future directions”.

Senior Resident Clinical Rounds, Department of Medicine, Children's Hospital, Boston MA, October, 2007; “Case discussion: Periodic fevers in Children”.

CCM Fellows Conference, Department of Anesthesiology & Critical Care Medicine, Children's Hospital, Boston MA, October, 2007. “Case discussion: Sedation/analgesia during ECMO”.

CCM Fellows Conference, Department of Pediatrics, Critical Care Medicine Division, Massachusetts General Hospital, Boston MA, October, 2007. “Pain in the Neonate and Fetus: 20 years later”.

Neurosurgical Grand Rounds, Department of Neurosurgery, University of Arkansas for Medical Sciences, October, 2007. “Pain during early life: Neuroscience and Development”.

Graduate Student Seminars, Department of Neurobiology & Developmental Sciences, University of Arkansas for Medical Sciences, October, 2007. Mentor for Chaoxuan Dong: “Ketamine Neurotoxicity is Age-Dependent and Dose-Dependent”.

Mayday Foundation site visit, Research Seminar, Arkansas Children's Hospital Research Institute, December, 2007. “The safety and efficacy of acupuncture for relieving acute pain in newborn infants”.

## 2008

1<sup>st</sup> Interdisciplinary Swiss Conference on *Pain Management in Neonates: Investing in the future*, Institute of Nursing Science of the University of Basel, Switzerland (INS); Bern, Switzerland, January, 2008. Keynote Address: “The clinical importance of pain in term and preterm neonates: Focus on the vulnerability of the developing brain”.

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Institute of Nursing Science, University of Basel & the University Children's Hospital, Basel, Switzerland, January, 2008. Special Lecture: "Neonatal Analgesia in the post-NEOPAIN era".

Invited Speaker, House of Commons of the British Parliament, Special Meeting on Term Limits, MP Nadine Dorries, London, U.K., January, 2008. "Emerging Scientific Evidence for Fetal Pain".

Pain Through the Ages-Common Themes, Canadian Pain Society, Victoria, British Columbia, May, 2008. "Pain in Neonates: Long-Term Changes in Brain Function and Behavior."

Neonatal Advanced Practice Nursing Forum, Dartmouth-Hitchcock Medical Center, Washington, D.C., June, 2008. "The Evidence For and Importance of Fetal Pain".

NIDCAP International Conference, HELSE SUNNMØRE HF, Aalesund, Norway, June, 2008. "Conscious Pain Perception in the Newborn".

IPOKRATES Seminar, IPOKRATES, Madrid, Spain, June, 2008. "Neonatal Comfort: analgesia, sedation and individualized loving care".

IPOKRATES Seminar, IPOKRATES, Madrid, Spain, June, 2008. "Management of Pain in Premature Infants: Lessons from the NEOPAIN Trial".

12<sup>th</sup> World Congress on Pain, International Association for the Study of Pain, Glasgow, Scotland, August, 2008. "Neonatal pain management: Current controversies and new data".

PedsPLACE, UAMS Center for Distance Health, Little Rock, Arkansas, September, 2008. "The Collaborative Critical Care Research Network-access to a national resource".

Arkansas Biosciences Institute Fall Research Symposium, Little Rock, Arkansas, October, 2008. Posters presented "Acupuncture reduces inflammatory hyperalgesia in newborn rats" and "Repetitive neonatal pain alters adult cognitive performance and brain cytokine expression".

1<sup>st</sup> International Congress of UENPS Union of European National and Perinatal Societies, Rome, Italy, November, 2008. "Pain at the Dawn of Human Consciousness".

Faculty Facilitator, Mock Code on Septic Shock, Arkansas Children's Hospital's PULSE center, Little Rock, AR, February, 2008.

Grand Rounds, Department of Pediatrics, University of Arkansas of Medical Sciences, February, 2008. "Once a Pediatrician, always a Pediatrician? - Views from the American Board of Pediatrics".

Panel Discussion, Complementary & Alternative Medicine Spirituality Panel, University of Arkansas of Medical Sciences, March, 2008. "Religion and spirituality in the practice of medicine: what, when, and why?"

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Research Seminars, Department of Pediatrics, M.D. Anderson Cancer Center, Houston, Texas, March, 2008. “New frontiers in neonatal pain research”.

Grand Rounds, Department of Pediatrics, University of Texas at Houston and Hermann Memorial Children’s Hospital, Houston, Texas, March, 2008. “Neonatal pain management: current state-of-the-art and novel directions”.

CPCCRN Steering Committee meeting, Bethesda, MD; March, 2008. Full Protocol presentation for the PROTAW randomized trial.

## 2009

22nd Annual Graven’s Conference o the Physical and Developmental Environment of the High Risk Infant, Clearwater Beach, Florida, January, 2009. “Neonatal Pain Management”.

22nd Annual Graven’s Conference on the Physical and Developmental Environment of the High Risk Infant, Clearwater Beach, Florida, January, 2009. **Keynote Address:** “Pain at the dawn of human consciousness”.

1st NeoOpioid Project Workshop, Stockholm, Sweden, January, 2009. “Opioid Tolerance in the PICU/NICU; mechanisms, assessment, and management”.

Pediatric Grand Rounds, Cooper Regional Children’s Hospital, Camden, New Jersey, February, 2009. “Pain Management of the Pediatric Trauma Patient”.

Special Residents lecture, Cooper Regional Children’s Hospital, Camden, New Jersey, February, 2009. “Pain Management in the NICU”.

54<sup>th</sup> Annual Meeting; Swedish Paediatric Society, **Nils Rosén von Rosenstein Award lecture**, University of Uppsala and the Swedish Society of Medicine, April, 2009. “Love, Pain & Intensive Care”.

27<sup>th</sup> Neonatal Conference, Nationwide Children’s Hospital, Columbus, OH, May, 2009. “Physiology of Fetal & Neonatal Pain & Stress”

27<sup>th</sup> Neonatal Conference, Nationwide Children’s Hospital, Columbus, OH, May, 2009. “Love, Pain & Neonatal Intensive Care: How to Make a Difference”

Fellows Research Seminar, University of Ohio, Nationwide Children’s Hospital, Columbus, OH, May, 2009. “Ketamine analgesia for neonates: Friend or foe?”

32<sup>nd</sup> Annual Neonatal Advanced Practice Nursing Forum; Washington, D.C., June, 2009. “Developing Brain & Pain: Apply Developmental Pharmacology to Pain Management”.

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32<sup>nd</sup> Annual Neonatal Advanced Practice Nursing Forum; Washington, D.C., June, 2009. “Management of Acute Procedural Pain”

32<sup>nd</sup> Annual Neonatal Advanced Practice Nursing Forum; Washington, D.C., June, 2009. “Case Studies in the Management of Prolonged Pain”

Second Annual Pediatric Pain Master Class, Children’s Hospitals & Clinics of Minnesota, Minneapolis, MN, June, 2009. “Pain Management in Infants”

Development Neurobiology Colloquium presentation, Center for Study Behavior and Development, University of Minnesota, Minneapolis, MN, June, 2009. “Love, Pain & Neonatal Intensive Care: How to Make a Difference”

2<sup>nd</sup> Neonatal & Pediatric Palliative Care Conference, University Hospital, University of Medicine and Dentistry of New Jersey, Newark, NJ, October, 2009; Keynote Address: “Love, Pain & Neonatal Intensive Care”.

The **Sixth Annual Josephine Templeton Honorary Lecture**, The Children's Hospital of Philadelphia, Department of Anesthesiology & Critical Care Medicine, Philadelphia, PA, September, 2009. “Love, Pain & Intensive Care: Efforts in the clinic and community”

The Pediatric Critical Care Sub-Board Meeting, October, 2009, The American Board of Pediatrics, Chapel Hill. “Establishing a Simulation-Based Curriculum”

2<sup>nd</sup> Regional Neonatology Conference “A New Era: Advances in Palliative Care for Infants and Children in Pain”, New Jersey Medical School, New Jersey, October, 2009. “Neonatal Pain Management: From Dosage to Withdrawal.”

The Steering Committee Meeting, October, 2009, Collaborative Pediatric Critical Care Research Network (CPCCRN), Washington, D.C., “Planning for the H1N1Epidemic and a Novel Triage Strategy.”

Pediatric Analgesic Clinical Trials Workshop, Division of Analgesia, Anesthesia, and Rheumatology Products, Center for Drug Evaluation and Research, Food and Drug Administration, Baltimore, MD; December 3, 2009. “Dose finding studies in neonatal analgesia”.

## 2010

Mid-South Seminar on the Care of the Complex Newborn, Le Bonheur Children’s Hospital and University of Tennessee Health Science Center, Memphis, TN, January, 2010. “Love, Pain and Intensive Care.”

1<sup>st</sup> Annual Conference on Pediatric Psychological Trauma in Infants and Young Children from Illness, Injury and Medical Intervention, The University of Southern California, Los Angeles,



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CA, February, 2010. “Consciousness, Cortical Function, and Pain Perception in Non-Verbal Humans.”

8th International Symposium on Pediatric Pain, International Association for the Study of Pain, in Acapulco, Mexico, March 7<sup>th</sup>, 2010 .“Use of Ketamine for Neonatal Pain Management.”

8th International Symposium on Pediatric Pain, International Association for the Study of Pain, in Acapulco, Mexico, March 7<sup>th</sup>, 2010 .“Fetal Pain and Consciousness.”

Pediatric Grand Rounds, Department of Pediatrics, University of Michigan and C.S. Mott Children’s Hospital, Ann Arbor, MI, March, 2010. “Ketamine for Infants: Poison or Panacea?”

Pediatric Scientific Seminar Series, Department of Pediatrics, University of Michigan and C.S. Mott Children’s Hospital, Ann Arbor, MI, March, 2010. “Analgesia and Sedation in the PICU: Evidence-based management for special cases”.

24<sup>th</sup> Annual Pediatric Anesthesiology Meeting, Society for Pediatric Anesthesiology, Symposium on *Pain and the Pediatric Patient*, San Antonio, TX, April, 2010.“Prolonged opioids, pediatric patients, and problems.”

36<sup>th</sup> Annual Pediatric Critical Care Colloquium, University of Pittsburg School of Medicine, Pennsylvania, May, 2010. “Crises in Haiti: the Critical Needs of Children.”

3rd Annual Pediatric Pain Master Class, Children’s Hospitals and Clinics of Minnesota, Minneapolis, MN, June, 2010. “When Opioids Don’t Work Anymore – Biology and Management.”

3rd Annual Pediatric Pain Master Class, Children’s Hospitals and Clinics of Minnesota, Minneapolis, MN, June, 2010. “Pain Management in Infants.”

Invited Speaker, Consecration Ceremony for the opening of Le Bonheur Children’s Hospital, June 2010.

2010 Perinatal Medicine Conference, *Perinatal Health & Healing: Partnerships for Success*, St. Dominic Hospital, Mississippi Perinatal Association, Jackson, MS, July, 2010. “Pain Control in the NICU.”

Ron Lemire Symposium on Contemporary Pediatric Critical Care Medicine, Seattle Children’s Hospital, Seattle, WA, August, 2010. **Keynote Address:** “The Pathobiology of Pain & Stress in PCIU/NICU Patients.”

“Open Hearts, Open Minds and Fair Minded Words”, A Conference on Life and Choice in the Abortion Debate, Princeton University, New Jersey, Newark, NJ, October, 2010. “When Might a Fetus Feel Pain and What Should We Do About It?”

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**Frontiers-In-Pain-Research** Lecture Series, Montreal General Hospital, Quebec, Canada, November, 2010. "Use of Ketamine in Neonates: Toxic or Therapeutic?"

3<sup>rd</sup> International Conference on **Excellence in Pediatrics**, London, UK, December, 2010. Expert Round Table on "Pain Management" "Management of Acute Pain in Neonates."

8<sup>th</sup> International Conference, Pediatric Cardiac Intensive Care Society, Miami Beach, Miami, FL, December, 2010. "Post-operative Analgesia/Sedation and Modulation of the Stress Response."

Children's Foundation Research Center Seminar, The University of Tennessee Health Science Center, Le Bonheur Children's Hospital, Memphis, TN, December, 2010. "Use of Ketamine for Neonates: Toxic or Therapeutic?"

## 2011

FDA Anesthetic and Life Support Drugs Advisory Committee (ALSDAC), Center for Drug Evaluation and Research, Silver Springs, MD, March 10, 2011. *"Ketamine and the Neonatal Brain: Rat Pups vs. Babies."*

Brain Awareness Week Symposium and Public Lecture, UT Neuroscience Institute, University of Tennessee Health Science Center and The Urban Child Institute, Memphis, TN., March, 2011. *"Consciousness, Pain and Stress in Early Life: How it shapes who we are and what we become."*

Pediatric Academic Societies and Asian Society for Pediatric Research Joint Meeting, PAS Topic Symposium: **"Impact of Surgery, Anesthesia and Analgesia on the Newborn Brain"**, Denver, CO., April 30 - May 3, 2011. *"Pain Therapy and the Brain - A Scientific Rationale."*

The Urban Child Institute and Children's Foundation Research Center, Le Bonheur Children's Hospital, Memphis; May 16, 2011. *"Use of the MEG for research on early brain development"*.

Pain Management and Developmental Care in Premature Newborns Symposium, Mayanei HaYeshua Medical Center, Bnei Brak, Tel Aviv, Israel, May 19, 2011. *"Consciousness and Pain in Early Life."*

Pain Management and Developmental Care in Premature Newborns Symposium, Mayanei HaYeshua Medical Center, Bnei Brak, Tel Aviv, Israel, May 19, 2011. *"Love, Pain, and Intensive Care."*

5th Annual NeoOpioid Meeting, Karolinska Institute and Astrid Lindgren's Children's Hospital, Stockholm, Sweden, June 1, 2011. *"Advantages and disadvantages of Morphine vs. Fentanyl in a historical, present and future perspective"*.

Quarterly Meeting, American Association of Physicians from India, Memphis Chapter, Germantown TN, June 9, 2011. *"Summer Youth Conference on UNITY and HOPE: a program for youth development in Memphis"*.

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4th Annual Pediatric Pain Master Class, Children's Hospitals and Clinics of Minnesota, Minneapolis, MN, June 16, 2011. *"Pain Management in Infants."*

4th Annual Pediatric Pain Master Class, Children's Hospitals and Clinics of Minnesota, Minneapolis, MN, June 16, 2011. *"When Opioids Don't Work Anymore - Biology and Management."*

Pediatric Critical Care Medicine, Fellow's Didactic Lectures, Le Bonheur Children's Hospital, Memphis TN; July 19, 2011. *"Analgesia and Sedation in Critically Ill Children"*.

Hospital Ethics Committee, Le Bonheur Children's Hospital, Memphis TN; July 20, 2011. *"Increased mortality in Latino/Hispanic patients at Le Bonheur"*.

Quality Council, Le Bonheur Children's Hospital, Memphis TN; July 29, 2011. *"Increased mortality in Latino/Hispanic patients at Le Bonheur"*; *"Selected Outcomes and Medical Errors monitored in PICU patients"*.

Pediatric Critical Care Medicine, Fellow's Lectures, Le Bonheur Children's Hospital, Memphis TN; August 30, 2011. *"When Opioids Don't Work Anymore - Biology and Management."*

Pediatric Intensive Care Unit, Multi-Disciplinary Staff Training Courses, Le Bonheur Children's Hospital, Memphis TN; August 24, 25 & 31, September 1 & 9, 2011. *"Brief Introduction to TeamSTEPPS Training"*.

System Ethics Committee Meeting, Methodist Le Bonheur Healthcare System, Center of Excellence in Faith & Health, Innovation Studio, Methodist University Hospital, Memphis; September 13, 2011. *"Increased mortality in Latino/Hispanic patients at Le Bonheur"*.

Department of Pediatrics, Grand Rounds Presentation, Le Bonheur Children's Hospital, Memphis, TN; September 14, 2011. *"Faculty, Funds, and the Fourth Leg of Academia"*

Monthly Fellows Seminar for Neonatal-Perinatal Medicine, Pediatric Surgery, and Pediatric Critical Care Medicine Fellows, Le Bonheur Children's Hospital, Memphis, TN; September 14, 2011. *"Mechanical Ventilation"*.

City of Memphis, Mayor's Office, Multi-Cultural Coalition Meeting, Memphis, TN. September 22, 2011. *"Race/Ethnicity and Clinical Outcomes in Children: Are we doing the best we can?"*

2<sup>nd</sup> International Conference, Trauma in Infancy on "Do Babies Remember Trauma: The Psychology and Neurobiology of Early Trauma", Columbia Center for Psychoanalytic Training & Research and the Margaret Mahler Foundation; October 1, 2011. Keynote Speaker: *"Consciousness and Pain in Early Development"*.

Anesthesia Grand Rounds, Department of Anesthesia, Harvard Medical School and Children's Hospital, Boston, MA; October 5, 2011. *"Ketamine in neonates: toxic or therapeutic?"*

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Acute and Emergency Care Pediatric Conference, Emergency Medical Services for Children and American Academy of Pediatrics (Tennessee Chapter), Le Bonheur Children's Hospital, October 22, 2011; Memphis, TN. *"Children Caught in a Disaster: Special Considerations for Assessment, Management and Triage."*

63<sup>rd</sup> Annual Scientific Assembly, Tennessee Academy of Family Physicians" (TNAFP), Convention Center in Gatlinburg, TN; October 25-28, 2011. *"Pediatric Pain Assessment and Management"*.

5th Annual Neonatology Conference at Scott & White *Current Concepts and Footsteps for the Future*, Department of Pediatrics, Scott & White Healthcare and Medical Education Center, Scott & White Hospital, Temple, Texas; November 1-2, 2011. Keynote Lecture: *"Pain and its Management in Neonates"*.

Annual Retreat, Division of Critical Care Medicine, Department of Pediatrics and Pediatric Intensive Care Unit Staff, Le Bonheur Children's Hospital, Memphis; November 9, 2011. *"Balancing the Paradox of Time, Outputs, and Measures: the three roles we all play"*.

Annual Retreat, Department of Pediatrics and Le Bonheur Children's Hospital, Fogelman Business Center, University of Memphis, Memphis; November 12, 2011. *"Steps to becoming a top-tier Children's Hospital"*.

Pediatric Critical Care Medicine, Fellow's Didactic Lectures, Le Bonheur Children's Hospital, Memphis TN; November 15, 2011. *"Extubation Preparedness"*.

4<sup>th</sup> Annual Pediatric Research Day, "Current Research in Neurodevelopment and Neurological Disorders in Children at the University of Tennessee Health Science Center and Le Bonheur Children's Hospital", Morning Session Chair and Master of Ceremonies, November 16, 2011. *"Neurodevelopmental Research and Introduction of Speakers"*.

National Center for Toxicological Research, Center for Neurotoxicology and Neurodevelopment Research Seminars, Jefferson, AR; November 30, 2011. *"Anesthetic Neurotoxicity associated with Ketamine: Current Results and Future Directions"*.

International Pediatric Cardiac Surgery Conference, Fortis Escorts Heart Institute & Research Center, New Delhi, India; December 28, 2011. Keynote Lecture: *"Pain Management and Brain Protection in Cardiac Surgery: is there any connection?"*

## 2012

International Trauma Meeting, Danish National Conference, *Consensus Conference on Pediatric Trauma* in Odense, Denmark; January 16-17, 2012. Keynote Address: *"Pain, plasticity, prematurity: What are the long-term consequences of severe pain stimulation in infants?"*

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International Trauma Meeting, Danish National Conference, *Consensus Conference on Pediatric Trauma* in Odense, Denmark; January 16-17, 2012. “*Assessment and Treatment of Pain in Infants*”.

Society for Pediatric Anesthesia Meeting, *Pediatric Anesthesiology 2012* in Tampa Florida; February 23 – 26, 2012. “*Pain, Analgesics, and the Developing Brain: How much and for how long?*”

2<sup>nd</sup> International Obstetrical & Neonatology Congress, Máxima Medisch Centrum Hospital, Veldhoven, The Netherlands, March 6-9, 2012. Inaugural Address: “*Pain, Consciousness, and the Making of a Human*”.

2<sup>nd</sup> International Obstetrical & Neonatology Congress, Máxima Medisch Centrum Hospital, Veldhoven, The Netherlands, March 6-9, 2012. Workshop on Pharmacology of the Newborn: “*Pharmacologic aspects of Morphine use in Neonates*”.

Pediatric Critical Care Medicine, Fellow’s Lectures, Le Bonheur Children’s Hospital, Memphis, TN; March 19, 2012. “*Regulatory Considerations in Clinical Research and Data & Safety Monitoring Board*”.

Pediatric Critical Care Medicine, Fellow’s Didactic Lectures, Le Bonheur Children’s Hospital, Memphis TN; March 20, 2012. “*Pressors, Inotropes, Vasodilators and Inodilators*”.

Annual Brain Awareness Week, University of Tennessee Neuroscience Institute and The Urban Child Institute, Memphis, TN; March 22, 2012. “*Long-term Effects of Neonatal Pain/Stress*”.

Sujit and Uma Pandit Lectureship in Anesthesiology, University of Michigan Health Systems, Ann Arbor, MI; March 28, 2012. Anesthesia Lunch & Learn: “*Opioid/Sedative Withdrawal: Case Presentation and Novel Strategies*”.

Sujit & Uma Pandit Lectureship in Anesthesiology, University of Michigan Health Systems, Ann Arbor, MI; March 29, 2012. M&M Conference. “*Ketamine Neurotoxicity in Newborns: New Findings*”.

Pediatric Critical Care Medicine, Fellow’s Didactic Lectures, Le Bonheur Children’s Hospital, Memphis TN; April 10, 2012. “*Poisoning*”.

Invited Guest Speaker, ***Teach for America*** Induction Ceremony, Minglewood Hall, Memphis, TN; June 8, 2012. “*Ending the vertical transmission of poverty and social disadvantage in Memphis*”.

5th Annual Pediatric Pain Master Class, Children’s Hospitals and Clinics of Minnesota, Minneapolis, MN, June 14, 2012. “*Evidence-Based Pain Management in Neonates & Infants*.”

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5th Annual Pediatric Pain Master Class, Children's Hospitals and Clinics of Minnesota, Minneapolis, MN, June 14, 2012. *"When Opioids Don't Work Anymore - Biology and Management."*

48th Annual Meeting of the Japanese Society of Perinatal & Neonatal Medicine; Saitama, Japan on July 8 - 10, 2012. Special Lecture: *"Development of the pain in the fetus and neonate"*.

48th Annual Meeting of the Japanese Society of Perinatal & Neonatal Medicine; Saitama, Japan on July 8 - 10, 2012. Keynote Lecture: *"Management of pain in the neonate: current practice and novel options"*.

48th Annual Meeting of the Japanese Society of Perinatal & Neonatal Medicine; Saitama, Japan on July 8 - 10, 2012. Workshop on *"Love, Pain, and Intensive Care"*.

Pediatric Critical Care Medicine, Fellow's Didactic Lectures, Le Bonheur Children's Hospital, Memphis TN; July 24, 2012. *"Analgesia and Sedation"*.

Quality Council Presentation, Le Bonheur Children's Hospital, Memphis, TN; July 27, 2012. *"Annual Report for PICU Patient Outcomes: Benchmarking with other Academic Children's Hospitals"*.

Lectures at Summer Course, International Youth Conference, Guyana University, Georgetown; August 3, 2012. *"Developing Career Pathways and Training Programs for Pediatricians"*.

Lectures at Summer Course, International Youth Conference, Guyana University, Georgetown; August 4, 2012. *"Science, Spirituality, & Service: The Role of the Youth"*.

Sophia Children's Hospital, Rotterdam, The Netherlands; September 11, 2012. *"Long Term effects of opioid analgesia in neonates"*.

UT RockS at University of Tennessee Health Science Center, Department of Pediatrics, Memphis, TN; September 18, 2012. *"Writing the K-Award Career Development Plan"*.

Keynote Speaker, International Conference on ***"Do Babies Remember Trauma? The Psychology and Neurobiology of Early Trauma"*** sponsored by The Margaret Mahler Foundation & The Columbia Center for Psychoanalytic Training and Research, Columbia University, New York, NY; October 1, 2012. *"The Long-term Effects of Pain and Stress in Early Life"*.

CANDLE Investigators Meeting, The Urban Child Institute, Memphis, TN; October 10, 2012. *"Hair cortisol as a measure of chronic stress"*.

Pediatric Critical Care Medicine, Fellow's Didactic Lectures, Le Bonheur Children's Hospital, Memphis TN; October 16, 2012. *"Mechanical Ventilation"*.



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National Conference & Exhibition (NCE), American Academy of Pediatrics, October 20-23, 2012; New Orleans, LA. Joint Program: Section on Perinatal Pediatrics and Section on Anesthesiology & Pain Medicine. *"Opioid & Benzodiazepine Tolerance and Withdrawal"*.

National Conference & Exhibition (NCE), American Academy of Pediatrics, October 20-23, 2012; New Orleans, LA. Joint Program: Section on Perinatal Pediatrics and Section on Anesthesiology & Pain Medicine. *"Long-term effects of Neonatal Pain & Analgesia"*.

Pediatric Critical Care Fellow's Lecture Series, Department of Pediatrics, Le Bonheur Children's Hospital, Memphis, TN; October 23, 2012. *"Extubation Preparedness."*

81<sup>st</sup> Perinatal & Developmental Medicine Symposium, American Academy of Pediatrics, Perinatal Section, "Neonatal Pain, Stress and Sedation in the 21<sup>st</sup> Century" Marco Island, Florida; November 15-18, 2012. *"Fetal and Neonatal Pain: Development, Physiology, Assessment"*.

81<sup>st</sup> Perinatal & Developmental Medicine Symposium, American Academy of Pediatrics, Perinatal Section, "Neonatal Pain, Stress and Sedation in the 21<sup>st</sup> Century" Marco Island, Florida; November 15-18, 2012. *"Opioids in Neonates: Early Studies and Current Research"*.

Quality Council Presentation, Le Bonheur Children's Hospital, Memphis, TN; December 14, 2012. *VPS Annual Report*.

## 2013

Pediatric Critical Care Fellow's Lecture Series, Le Bonheur Children's Hospital, Memphis, TN; January 10, 2013. *"Pressors, Inotropes, Vasodilators and Inodilators"*.

Invited Speaker & Panel Discussant, ACTION Pediatric Pain Research Consortium Meeting, January 24-25, 2013 St. Regis Hotel, Washington, DC. *"Clinical Trials for Neonates and Infants: Challenges in Study Design and Execution"*.

51<sup>st</sup> Clinical Conference in Pediatric Anesthesia, University of Southern California and Children's Hospital Los Angeles, Anaheim, CA; February 8-10 2013. *The Dr. Digby Leigh Distinguished Speaker*. *"Anesthetic Neurotoxicity: Lessons from Ketamine"*.

Child Development Conference, Kinnaret College, Tzubei, Israel; April 9, 2013. *Keynote Speaker*: *"Long-term implications of pain/stress in infancy"*.

CANDLE Investigators Meeting, The Urban Child Institute, Memphis, TN; April 10, 2013. *"Summary of NIH Workshop: Nature and Nurture: Genetic and environmental Influences on Children's Responses to Adversity"*.

Visiting Professorship, Albert Einstein School of Medicine, Montefiore Medical Center Department of Anesthesiology, New York, New York; April 21, 2013. *"Ketamine for Neonates: Toxic or Therapeutic?"*

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Invited Speaker, research seminar, Department of Anesthesiology, Columbia University Medical Center, New York, NY; April 24, 2013. *“Opioid tolerance & withdrawal: scientific opportunity or wasteland ahead?”*

Invited Grand Rounds Speaker, Department of Anesthesiology, Columbia University Medical Center, New York, NY; April 25, 2013. *“Ketamine, Neurotoxicity, and Rats! Where do we go from here?”*

CANDLE Investigators Meeting, The Urban Child Institute, Memphis, TN; May 1, 2013. *“Methods for hair cortisol measurements”*.

Pediatric Academic Societies Annual Meeting, Washington, D.C.; May 6, 2013. Community, Family, Health and Genetics: Risk Factors for Socio-emotional Development in Urban Children. Conditions Affecting Neurocognitive Development and Learning in Early Childhood. *“What, Why, & How: Does early stress shape child development?”*.

Visiting Professorship, Chicago Children’s Research Center, Lurie Children’s Hospital, Chicago, IL; May 8-10, 2013. *“Transforming Clinical Research at Lurie Children’s: funded, futuristic, family-centered”*.

6<sup>th</sup> Annual Pediatric Pain Master Class, Children’s Institute for Pain and Palliative Care, Minneapolis, MN; June 1-7, 2013. *“Pain Management in Infants.”*

6<sup>th</sup> Annual Pediatric Pain Master Class, Children’s Institute for Pain and Palliative Care, Minneapolis, MN; June 1-7, 2013. *“When Opioids Don’t Work Anymore – Biology & Management.”*

9<sup>th</sup> International Symposium on Pediatric Pain, International Association for the Study of Pain (IASP), Special Interest Group on Pediatric Pain, Stockholm, Sweden; July 15-21, 2013. Workshop Chair: *Opioid Therapy in Neonates: Long-term Effects & Functional Outcomes.*

PCCM Fellows’ Conferences, Department of Pediatrics, University of Tennessee Health Science Center and Le Bonheur Children’s Hospital, Memphis, TN; July 23<sup>rd</sup>, 2013. *“Mechanical Ventilation 101”*

PCCM Fellows’ Conferences, Department of Pediatrics, University of Tennessee Health Science Center and Le Bonheur Children’s Hospital, Memphis, TN; August 1<sup>st</sup>, 2013. *“Professionalism in Academic Medicine”*

UT RockS – K-club, Department of Pediatrics, University of Tennessee Health Science Center and Le Bonheur Children’s Hospital, Memphis, TN; August 13<sup>th</sup>, 2013. *“Grantsmanship”*

Faculty Seminars, Universal Business School and the Strive India Educational Foundation, Karjat/Mumbai, India; August 27<sup>th</sup>, 2013. *“Can Faulty Afford not to Fund Raise?”*

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Honorary Visiting Professor Lecture & Workshop, Universal Business School and the Strive India Educational Foundation, Karjat/Mumbai, India; August 28<sup>th</sup>, 2013. *“Professionalism: A Critical Element for Developing Business Leaders”*.

Pediatrics Medical Group, Annual Conference “Innovations in the Care of the Surgical Neonate”, San Antonio, TX; September 18 - 20, 2013. *“Neonatal Anesthesia: Adverse effects, Tolerance and Neurotoxicity”*

Pediatrics Medical Group, Annual Conference “Innovations in the Care of the Surgical Neonate”, San Antonio, TX; September 18 - 20, 2013. *“Postoperative Pain Management in Neonates”*

International Conference, Society for Longitudinal and Life Course Studies (SLLS), “Growing Up and Growing Old: Health Transitions throughout the Lifecourse”, Amsterdam, The Netherlands; September 23-25, 2013. CANDLE Study Symposium: *“Hair Cortisol Levels in Early Childhood suggest HPA Axis Dysregulation”*

10<sup>th</sup> Annual **Masterclass for Honors Medical Students**, 100<sup>th</sup> Anniversary Celebrations of the Erasmus University Medical Center, Faculty of Medicine, Rotterdam, The Netherlands; October 3<sup>rd</sup>, 2013. *“Professionalism, Creativity, and Serendipity in Developing an Academic Career”*

9<sup>th</sup> Annual **“In Praise of Medicine” Public Meeting**, 100<sup>th</sup> Anniversary Celebrations of the Erasmus University Medical Center, Faculty of Medicine, 150<sup>th</sup> Anniversary of Sophia Children’s Hospital, Rotterdam, The Netherlands; October 4, 2013. **Keynote Public Address:** *“Pain in infancy: from stress to society”*

14<sup>th</sup> Jackson Rees Symposium, Sophia Children’s Hospital, Rotterdam, The Netherlands; October 5, 2013. **Dr. Jackson Rees Distinguished Lecturer:** *“Neurotoxic vs. Neuroprotective Effects of Neonatal Ketamine”*

NIH/NIDA Webinar on “Measuring Risk & Resilience for Developing Drug Abuse in Adolescents”, The Urban Child Institute, Memphis, TN; November 20<sup>th</sup>, 2013. *“Biomarkers for Chronic Stress during Early Childhood”*.

AstraZeneca and Quintiles Consulting Group, Mock FDA Session for approval of Naloxegol, Doubletree Hotel, Wilmington, DE; December 20<sup>th</sup>, 2013. *“Opioid Tolerance in Children”*.

## 2014

Harmony Health Clinic, Governor Mike Beebe Annual Volunteer Recognition Day, Governor’s Mansion, Little Rock, Arkansas. January 22, 2014. *“Providing compassionate health care for the uninsured”*.

Mid-South Seminar on the Care of the Complex Newborn, Department of Pediatrics, Le Bonheur Children’s Hospital and University of Tennessee Health Science Center, Memphis, TN; January 24-25, 2014. *“Pain, Consciousness, and the Personification of Newborns”*.

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Mid-South Seminar on the Care of the Complex Newborn, Department of Pediatrics, Le Bonheur Children's Hospital and University of Tennessee Health Science Center, Memphis, TN; January 24-25, 2014. *"Pain Management in Newborns: Identifying best practices."*

Annual Neonatology Keynote Lecture, Pediatrics Section, Combined Sections Meeting of the American Physical Therapy Association (APTA), Las Vegas, Nevada; February 4-6, 2014. *"Needles, tubes, and intensive care: What happens to the baby?"*

3<sup>rd</sup> Annual Neonatal & Pediatric Pearls (NAPP) Conference, UCLA Department of Pediatrics and Mattel Children's Hospital, Mumbai, India; February 8-9, 2014. Keynote Address: *"Development of nociception in the fetus and the newborn."*

3<sup>rd</sup> Annual Neonatal & Pediatric Pearls (NAPP) Conference, UCLA Department of Pediatrics and Mattel Children's Hospital, Mumbai, India; February 8-9, 2014. Debate: *"Pain medications should / should not be used in the NICU"*

Le Bonheur 101 Science Presentation, Le Bonheur Children's Foundation and Children's Foundation Research Institute, Memphis, TN; March 20<sup>th</sup>, 2014. *"Research on Pain in Infancy: from stress to society"*

Post-Norfleet Symposium Debriefing Meeting, The Urban Child Institute, Memphis, TN; March 21<sup>st</sup>, 2014. *"Future Directions for the CANDLE Study"*

Integrated Biomedical Science Seminar, School of Graduate Studies, Loma Linda University, Loma Linda, CA; April 17<sup>th</sup>, 2014. *"Ketamine for neonates: toxic or therapeutic?"*

Pediatric Academic Societies' Annual Meeting, American Pediatric Society/Society for Pediatric Research, Workshop on **"Neonatal Pain: Lost in Translation"**, Vancouver, British Columbia, Canada; May 1-6, 2014. *"Battle of the bedside and bench: Is your data clinically relevant or scientifically sound?"*

Pediatric Academic Societies' Annual Meeting, American Pediatric Society/Society for Pediatric Research, Platform presentations, Chairman of the session on **"Neonatal Pain Management"**, Vancouver, British Columbia, Canada; May 1-6, 2014.

Pediatric Academic Societies' Annual Meeting, American Pediatric Society/Society for Pediatric Research, Platform presentations, **"Neonatal Pain Management"**, Vancouver, British Columbia, Canada; May 1-6, 2014. *"Number of procedures and analgesic therapy in neonates admitted to NICUs: EPIPAIN-2 Study"*

Executive Dean's Invited Lecture, University of Miami Miller School of Medicine, Miami, FL; May 19<sup>th</sup>, 2014. *"Love, Pain, & Intensive Care: Building Pediatrics for the 21st Century"*.

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5<sup>th</sup> Annual **Professor I. David Todres, MD Grand Rounds**, Department of Pediatrics, Harvard Medical School and Massachusetts General Hospital, Boston, MA; June 2-3, 2014. *“Pain in infancy: from stress to society”*

7<sup>th</sup> Annual Pediatric Pain Master Class, Children’s Institute for Pain and Palliative Care, Minneapolis, MN; June 13, 2014. *“Pain Management in Infants.”*

7<sup>th</sup> Annual Pediatric Pain Master Class, Children’s Institute for Pain and Palliative Care, Minneapolis, MN; June 13, 2014. *“When Opioids Don’t Work Anymore – Biology & Management.”*

Grand Rounds Presentation, Department of Pediatrics, University of Southern California, Children’s Hospital Los Angeles, Los Angeles, CA: August 1, 2014. *“Pain in Infancy: From stress to society.”*

Fellows’ Conference, Department of Anesthesiology & Critical Care Medicine, University of Southern California, Children’s Hospital Los Angeles, Los Angeles, CA: August 1, 2014. *“Ketamine for Neonates: Toxic or Therapeutic?”*

Department of Pediatrics Research Seminars, University of Maryland School of Medicine, Baltimore, MD: August 7, 2014. *“Positive and Negative inputs into early development: A search for non-invasive biomarkers.”*

Grand Rounds Presentation, Department of Pediatrics, University of Maryland School of Medicine, Baltimore, MD: August 7, 2014. *“Pain in infancy: From Stress to society.”*

Keynote Speaker, Health Beliefs and Practices Forum, Health Ministry Network of the Mid-South, Catholic Center, Memphis, TN. August 14<sup>th</sup>, 2014.

33<sup>rd</sup> Annual Neonatal & Perinatal Conference, Pan-American Association of Pediatrics, Santiago, Chile; August 21-23, 2014. Keynote Address: *“The development of pain processes in the fetus and newborn”*

33<sup>rd</sup> Annual Neonatal & Perinatal Conference, Pan-American Association of Pediatrics, Santiago, Chile; August 21-23, 2014. *“Long term consequences of pain in newborn babies”*

33<sup>rd</sup> Annual Neonatal & Perinatal Conference, Pan-American Association of Pediatrics, Santiago, Chile; August 21-23, 2014. *“Post-surgery management of pain in newborn babies”*

Research Seminars, Department of Pediatrics, Stanford University School of Medicine and Lucille Packard Children’s Hospital, Palo Alto, CA; October 14<sup>th</sup>, 2014. *“Pain in infancy: from stress to society”*.

12<sup>th</sup> Annual **Dr. John J. Fangman Distinguished Professorship**, Minnesota Association of Neonatologists, Children’s Hospital and Clinics – Minneapolis, MN; October 27, 2014. *“Ketamine for Neonates: Toxic or Therapeutic?”*

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Grand Rounds, Department of Pediatrics, Children's Hospital and Clinics – Minneapolis, MN; October 28, 2014. *“Current evidence for pain management in the NICU”*.

Invited Speaker, International Hindi Day Celebrations, Indian Cultural Society Conference, Houston, TX; December 5<sup>th</sup>, 2014. Recitations of Hindi/Urdu Poetry.

## 2015

Senior Faculty Forum, Department of Pediatrics, Stanford University School of Medicine and Lucille Packard Children's Hospital, Palo Alto, CA; February 2<sup>nd</sup>, 2015. *“Building Critical Care Pediatrics for the 21<sup>st</sup> Century”*.

International Advisory Group, Leading Causes of Life Initiative, Wake Forest School of Medicine, Division of Public Health Sciences, Department of Social Sciences and Health Policy, Winston-Salem, NC; February 25<sup>th</sup>, 2015. *“Clinical experiences and Leading Causes of Life”*.

44<sup>th</sup> Annual Journees Nationales de Neonatologie, Institut Pasteur, Paris (France); March 26<sup>th</sup> and 27<sup>th</sup>, 2015. *Neurotoxicity vs. neuroprotection from analgesic agents in newborns*.

44<sup>th</sup> Annual Journees Nationales de Neonatologie, Institut Pasteur, Paris (France); March 26<sup>th</sup> and 27<sup>th</sup>, 2015. *Sedation and analgesia in European NICUs: Preliminary results from the EuroPAIN survey*.

Pediatric Academic Societies' Annual Meeting, San Diego, CA, April 25<sup>th</sup>, 2015. Platform presentation: *“Neonatal Electrical Stimulation of Acupuncture Points: Can Alternative Therapy Relieve Heelstick Pain in Neonates?”*

XIV International Congress of Intensive Care Medicine of Minas Gerais, Belo Horizonte, Brazil, May 21-23 2015. *“The Importance of Pain Relief in the Intensive Care Unit”*.

XIV International Congress of Intensive Care Medicine of Minas Gerais, Belo Horizonte, Brazil, May 21-23 2015. *“Options for sedation and analgesic in newborns: Is there any safe drug?”*

10<sup>th</sup> International Symposium on Pediatric Pain, International Association for the Study of Pain, Special Interest Group on Pain in Childhood, Seattle, WA; June 1-3, 2015. Plenary session: *“Selection of the Distinguished Career Award for Pediatric Pain 2015”*.

Annual Investigators Meeting, Pediatric Pain Research Consortium (PPRC), ACTION Partnership (Analgesic, Anesthetic, & Addiction Clinical Trial Translations, Innovations, Opportunities, and Networks), June 1<sup>st</sup>, 2015. *“Protocol to delay or prevent opioid tolerance”*.

8<sup>th</sup> Annual Pediatric Pain Master Class, Children's Institute for Pain and Palliative Care, Minneapolis, MN; June 13, 2015. *“Assessment and Management of Pain in Infants.”*



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8<sup>th</sup> Annual Pediatric Pain Master Class, Children's Institute for Pain and Palliative Care, Minneapolis, MN; June 13, 2015. *"Paying the price for opioid therapy: Tolerance and withdrawal."*

PCCM Fellows' Conferences, Department of Pediatrics, University of Tennessee Health Science Center and Le Bonheur Children's Hospital, Memphis, TN; July 23<sup>rd</sup>, 2015. *"Mechanical Ventilation 101"*.

PCCM Fellows' Conferences, Department of Pediatrics, University of Tennessee Health Science Center and Le Bonheur Children's Hospital, Memphis, TN; August 1<sup>st</sup>, 2015. *"Professionalism in Academic Medicine"*.

PCCM Fellows' Conferences, Department of Pediatrics, University of Tennessee Health Science Center and Le Bonheur Children's Hospital, Memphis, TN; August 18<sup>th</sup>, 2015. *"Clinical use of Steroids in Children with Sepsis"*.

Invited Speaker, WELL Faculty Brainstorming Session, Stanford Prevention Research Center, Department of Medicine, Stanford University School of Medicine; November 3<sup>rd</sup>, 2015. *"Biomarkers for Stress and Resilience: Lessons from Pre-School Children"*.

Invited Speaker and Panel Member, 5<sup>th</sup> Annual leadership Summit, **"Shaping Tomorrow's Global Leaders"**, Thursday, November 12<sup>th</sup>, 2015 at One World Trade Center, New York, NY. *"Lessons learned from personal leadership"*.

## 2016

3<sup>rd</sup> Annual Meeting, Society for Pediatric Pain Medicine (SPPM), The Broadmoor, Colorado Springs, CO; March 31<sup>st</sup>, 2016. *"Neonatal Pain: Assessment and Management"*.

7<sup>th</sup> Annual Pediatric Research Retreat, Department of Pediatrics, Berg Hall, Li Ka Shing Center for Learning & Knowledge, Stanford University School of Medicine, April 8<sup>th</sup>, 2016. *"Opioid Tolerance and Withdrawal: Exploring newer therapeutic options"*.

Nursing Shared Leadership Workshop, Pediatric ICU and Cardiac ICU Nursing Staff, Lucile Packard Children's Hospital, Palo Alto, CA; April 25<sup>th</sup>, 2016. *"Analgesia and sedation in critically ill children"*.

Nursing Shared Leadership Workshop, Pediatric ICU and Cardiac ICU Nursing Staff, Lucile Packard Children's Hospital, Palo Alto, CA; April 25<sup>th</sup>, 2016. *"Opioid tolerance and withdrawal: Prevention and Management"*.

Pediatric Critical Care Medicine Fellows Conference, Department of Pediatrics, Stanford University School of Medicine; June 16<sup>th</sup>, 2016. *"Steroids for ARDS: Evidence in Children"*.

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9<sup>th</sup> Annual Pediatric Pain Master Class, Children's Institute for Pain and Palliative Care, Minneapolis Children's Hospital & Clinics, Minneapolis, MN; June 15<sup>th</sup>, 2016. *"Assessment and Management of Pain in Infants."*

9<sup>th</sup> Annual Pediatric Pain Master Class, Children's Institute for Pain and Palliative Care, Minneapolis Children's Hospital & Clinics, Minneapolis, MN; June 14<sup>th</sup>, 2016. *"Paying the price for opioid therapy: Tolerance and withdrawal."*

Neonatology Clinical Consensus Conference, Division of Neonatal & Developmental Medicine, Department of Pediatrics, The Johnson Center for Pregnancy and Newborn Services, Stanford University School of Medicine, Palo Alto, CA; June 27<sup>th</sup>, 2016. *"Evidence-based pain management in the NICU"*.

Pediatric Critical Care Medicine Boot Camp, Washington University School of Medicine and Center for Simulation, Advanced Education and Innovation, Children's Hospital of Philadelphia, St. Louis, MO; July 16<sup>th</sup>, 2016. *"Guidelines for Traumatic Brain Injury"*.

Visiting Professor, Pain Awareness Week, Cincinnati Children's Hospital Medical Center, Department of Anesthesia, Pain Management Division, University of Cincinnati, Cincinnati OH. September 20-22, 2016.

Pediatric Grand Rounds, Cincinnati Children's Hospital Medical Center, Department of Pediatrics, University of Cincinnati, Cincinnati OH. September 20, 2016. *"Neonatal Pain Management: Integrating the science, the evidence, the art of therapeutics with early development"*.

Anesthesia Grand Rounds, Cincinnati Children's Hospital Medical Center, Department of Anesthesia, University of Cincinnati, Cincinnati OH. September 21, 2016. *"Paying the Price for Opioid Therapy: Avoid the credit cards of tolerance and withdrawal"*.

Nursing Grand Rounds, Cincinnati Children's Hospital Medical Center, Department of Pediatric Nursing, Cincinnati OH. September 21, 2016. *"Long-term Consequences of Repetitive Pain vs. Prolonged Analgesia in Neonates"*.

Advanced Pharmacy Lecture Series, Cincinnati Children's Hospital Medical Center, Department of Pediatric Pharmacy, Cincinnati OH. September 22, 2016. *"Use of Ketamine in Infants: Toxic or Therapeutic?"*.

Pediatric Grand Rounds, Department of Pediatrics, California Pacific Medical Center, San Francisco, CA; Oct. 14<sup>th</sup>, 2016. *"The Yin & Yang of Childhood: Can we measure it?"*.

Pediatric Critical Care Medicine Fellows Conference, Department of Pediatrics, Stanford University School of Medicine; Nov. 3<sup>rd</sup>, 2016. *"Assessment and Management of Infant Pain"*.

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International Medical Conference, Sri Sathya Sai Sanjeevani International Centre for Child Heart Care & Research, Millenium Hotel & Conference Center, Baghola (Haryana), India; Nov. 26<sup>th</sup>, 2016. *“Love, Pain, & Intensive Care: Re-defining Pediatrics for the 21st Century”*.

## 2017

Republic Day Celebrations, Societal Action & Initiative Global Mission, CET Soto Theater, San Jose, CA; Jan. 21<sup>st</sup>, 2017. *“Why focus on Child Heart Care?”*.

Physician Speaker at the Weekly All Hands Safety Meeting, Lucile Packard Children’s Hospital & Stanford Children’s Healthcare; Feb. 6<sup>th</sup>, 2017. *“Your role in the future of child health care”*.

Pediatric Critical Care Medicine Fellows Conference, Department of Pediatrics, Stanford University School of Medicine; Feb. 9<sup>th</sup>, 2017. *“Summary of Advances in Neurocritical Care”*.

Research Seminar, Eunice Kennedy Shriver National Institute for Child Health & Human Development (NIH/NICHHD), Pediatric Trauma and Critical Illness Branch (PTCIB); Feb. 14<sup>th</sup>, 2017. *“Summative measures for chronic stress and resilience in preschool children: Measuring the affective inputs in early development”*.

Invited presentation, Community Advisory Board, Stanford University School of Medicine, March 8<sup>th</sup>, 2017. *“Proposal to measure chronic stress and resilience in preschool children”*.

Presentation to the Critical Care Medicine Division, Department of Pediatrics at Fortis Medical Research Institute, Gurgaon (India); March 28<sup>th</sup>, 2017. *“Management of Analgesia and Sedation in the Pediatric ICU”*.

Public Health Nursing Seminar, Maternal, Child and Family Health Branch, Department of Health & Human Services, Santa Clara County, San Jose, CA; April 14<sup>th</sup>, 2017. *“Public health impact of chronic stress and resilience in preschool children”*.

Staff Training Seminar, First 5 Organization, Santa Clara County, San Jose, CA. *“The Yin and Tang of Early Child Development: How can we measure it?”*

Leadership Training Seminar, First 5 Organization, Santa Clara County, San Jose, CA. *“A Leading Causes of Life perspective applied to early child development in low SES families”*.

Meeting for prospective Rhodes Scholarship applicants, Bechtel International Center (Assembly Room), Stanford University, April 27<sup>th</sup>, 2017. *“How to increase the odds for winning a Rhodes Scholarship to Oxford University”*.

50<sup>th</sup> Anniversary Sikh Foundation International Conference on “Advancing Sikhs through education”, Li Ka Shing Center, Stanford University, May 7<sup>th</sup>, 2017. *“Love, Pain, & Intensive Care: Re-defining Pediatrics for the 21st Century”*.

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50<sup>th</sup> Anniversary Sikh Foundation International Conference on “Advancing Sikhs through education”, Li Ka Shing Center, Stanford University, May 7<sup>th</sup>, 2017. Chaired the Health Care Panel: *“Sikh Contributions to Health Care”*.

Critical Care Medicine Specialty Conference, Department of Anesthesia, Perioperative & Pain Medicine, Stanford University School of Medicine, Stanford Hospital, May 16<sup>th</sup>, 2017. *“Assessment of Prolonged Pain in Early Development: Need for a new taxonomy?”*.

2<sup>nd</sup> Annual Ideal Village Conference on *“Collaborations for the Ideal Village”*, Tresidder Memorial Union, Stanford University School of Medicine, June 16<sup>th</sup>, 2017. *“Global Health and the Ideal Village”*.

10<sup>th</sup> Annual Pediatric Pain Master Class, Children’s Institute for Pain and Palliative Care, Minneapolis Children’s Hospital & Clinics, Minneapolis, MN; June 19<sup>th</sup>, 2016. *“Infant pain is no gain”*.

10<sup>th</sup> Annual Pediatric Pain Master Class, Children’s Institute for Pain and Palliative Care, Minneapolis Children’s Hospital & Clinics, Minneapolis, MN; June 20<sup>th</sup>, 2016. *“Opioids sans Tolerance”*.

PICU Nursing Shared Leadership and Joint Staff Meeting, Lucile Packard Children’s Hospital Stanford, July 13<sup>th</sup>, 2017. *“Clinical Outcomes for PICU Patients in 2016: Results from the vPICU Database”*.

Pediatric Critical Care Medicine Fellows Conference, Department of Pediatrics, Stanford University School of Medicine; July 20<sup>th</sup>, 2017. *“Introduction to Mechanical Ventilation”*.

Pediatric Critical Care Medicine Fellows Conference, Department of Pediatrics, Stanford University School of Medicine; July 27<sup>th</sup>, 2017. *“Biomarkers in hair from critically ill children: Research Opportunities in the Pain/Stress Neurobiology Lab”*.

Keynote Address: 25<sup>th</sup> Annual Scientific Meeting, North American Sikh Medical & Dental Association (NASMDA), UB School of Medicine & Biomedical Sciences, State University of New York at Buffalo, Long Beach, CA; August 4<sup>th</sup>, 2017. *“Love, Pain, & Intensive Care: Redefining Pediatrics for the 21st century”*.

Keynote Address: Children's Symposium, Rigshospitalet, University of Copenhagen Hospital, Copenhagen, Denmark; September 22<sup>nd</sup>, 2017. *“Pain perception, long-term effects and anesthesia-induced neurotoxicity in newborns”*.

**APPENDIX:****Special Training Courses:**

- 1992 “Pediatric Flexible Bronchoscopy” Course University of North Carolina at Chapel Hill, August 1992 (Course Director: Dr. Robert Wood)
- 1993 “Pediatric and Neonatal E.C.M.O.” Course, Egleston Children’s Hospital at Emory University, October 1993 (Course Director: Dr. Devn Cornish)
- 1993 “Seven Habits of Highly Effective People”, Emory University Community Education Courses, Fall 1993
- 1994 “How to Manage Projects, Priorities, and Deadlines”, National Seminars Group, Rockhurst College Continuing Education Center, February 1994 (Director: Mark R. Truitt)
- 1994 “Powerful Communication Skills” National Seminars Group, Rockhurst College Continuing Education Center, October 1994 (Director: Steven C. Powell)
- 1994 “*In Situ* Hybridization and Recombinant DNA Technology” Exon-Intron and Johns Hopkins University, November 1994 (Course Director: Robert E. Farrell, Ph.D.)
- 2001 “Senior Administrators for Pediatric Departments”, Pediatric Academic Societies’ Meeting, Baltimore, May 2001. (Course Director: Thomas Boat, M.D.)
- 2008 UAMS Leadership Institute, Selected for the Class of 2009, completed intensive course on leadership in academic medicine.
- 2010 Workshop on the *7 Habits of Highly Effective People*, University of Tennessee Health Science Center, Human Resources Division.
- 2011 AAMC Workshop on ***Strategies, Skills Building & Best Practices in Philanthropy*** for the Faculty Members at Academic Medical Centers, February 10<sup>th</sup>, 2011.
- 2011 Participated in the AAMC Training Course ***2011 Executive Development Seminar for Associate Deans and Department Chairs***, Sept 30-Oct 4, 2011.
- 2015 Participated in the **3<sup>rd</sup> Annual Pediatric Education Day**, Department of Pediatrics. Stanford University School of Medicine.
- 2015 Participated in “Advances in Pediatric Trauma and Critical Illness Research: Building the field – Advancing the field”, Pediatric Trauma & Critical Illness Branch, *Eunice Kennedy Shriver* National Institute for Child Health & Human Development, Bethesda, MD, Dec. 11<sup>th</sup>, 2015.

**Activities as Director, Office for Research Promotion, 1995-96**  
**Department of Pediatrics, Emory University School of Medicine**

1. Information on grant opportunities for Departmental Divisions and young investigators.
2. Editorial support for planned studies and grants, Departmental liaison with the Office for Sponsored Programs. Extramural grant support submitted July 1995 to August 1996:
  - Total number of grant applications = 94
  - Total grant dollars applied for = \$ 9,655,658.00
    - \* direct expenses = \$ 7,788,920.00
    - \* indirect expenses = \$ 1,867,238.00
3. Editorial support for abstracts and manuscripts by fellows and young investigators.
4. Departmental review of oral and poster presentations presented at the Pediatric Academic Societies' Meeting, Washington, DC, May 6-10, 1996.
5. Supervision of Dr. Kevin Sullivan (statistician) for Departmental support activities.
6. Planning for an intramural Seed Grants Program with three cycles of funding.
7. Planned and executed the Fellows Introductory Course, August 1996, which included:
  - Clinical Methods Workshop
  - Computer Skills and Software Training
  - Statistical Methods Course
  - Grant Applications to the N.I.H.
  - Developing an Academic Career
8. Designed and installed the Departmental Research Database.
9. Formulated a long-term Departmental Research Strategy with senior faculty members.
10. Established the availability of MPH students from Department of Epidemiology, Rollins School of Public Health to work on clinical research projects in Pediatrics.
11. Developed procedures for the handling of controversial research data with the Risk Management Unit in Egleston Children's Hospital.
12. Chairman of a multidisciplinary task-force to define Research Administration at Egleston Children's Hospital. Designed structures to allow for:
  - accounting and billing for research services
  - central clearinghouse for tracking IRB approved protocols, examine consent forms
  - provide help in developing budgets for grant applications
13. Interviewed candidates for the position of Chairman, Department of Pediatrics, with a focus on research development for Chairman candidates.



**Academic Activities During Residency Training and Fellowship:**

1. Lectures in Elementary Statistics: - A complete course of statistics given in 6 weekly lectures to residents, fellows and staff members of the Department of Anesthesia, Children's Hospital, Boston; November & December 1986.
2. Fellows Lectures: - (Dept. of Anesthesia, The Children's Hospital, Boston).
  - (a) May, 1986: "Does the newborn infant really need anesthesia?"
  - (b) June, 1986: "Scoring methods in anesthesia, surgery, and trauma. I. Studies in adult patients."
  - (c) June, 1986: "Scoring methods in anesthesia, surgery and trauma. II. Studies in pediatric patients and prediction of postoperative outcome."
  - (d) September, 1986: "Randomized trials of halothane and fentanyl anesthesia in newborn infants."
  - (e) March, 1987: "Evidence for pain perception in the human fetus and neonate."
  - (f) June, 1987: "Results of the randomized trial of high-dose sufentanil anesthesia for neonates undergoing cardiac surgery."
  - (g) July, 1987: "Neuroendocrine stress responses in neonates: where do we go from here?"
  - (h) December, 1987: "The historical basis for current anesthetic practices in neonates."
3. Resident's Lectures: - (Dept. of Medicine, Children's Hospital, Boston.)
  - (a) October, 1988: "Assessment and management of pain in children."
  - (b) September, 1989: "Toilet training practices across different cultures: implications for pediatric practice."
  - (c) March, 1990: "Headache and recurrent abdominal pain in children."
  - (d) September, 1990: "School phobia in children: assessment and management."
  - (e) October, 1990: "Attention deficit hyperactivity disorder."
  - (f) April, 1991: "Assessment and management of constipation in our outpatient practice."
  - (g) May, 1991: "The many faces of child abuse."
4. Arranged Core Curriculum Lectures in Pediatrics for the year 1990-91, Department of Medicine, Children's Hospital, Boston.
5. Fellow's Lectures: - (Neonatal & Pediatric Intensive Care Units, M.G.H. Boston, MA)
  - (a) July, 1991: "Pain and sedation in the ICU."
  - (b) August, 1991: "Transport of critically ill burn patients."
  - (c) August, 1991: "Management of status epilepticus."
  - (d) September, 1991: "Neonatal stress responses: clinical implications."
  - (e) September, 1991: "How to write a research grant application."
  - (f) September, 1991: "Hemodynamic monitoring and oxygen transport."
  - (g) September, 1991: "Use of Swan-Ganz catheters in pediatric patients."
  - (h) October, 1991: "Diagnosis and management of the cyanotic newborn."
  - (i) November, 1991: "Diabetic ketoacidosis."
  - (j) November, 1991: "Pain, sedation, and muscle relaxation in the ICU."
  - (k) December, 1991: "Drug therapy for IVH in premature neonates."

- (l) December, 1992: "Practical Instructor for P.A.L.S. course."
- (m) January, 1992: "Respiratory physiology and ventilator management."
- (n) January, 1992: "Analgesia and sedation in the ICU."
- (o) February, 1992: "Respiratory physiology in neonates and older children."
- (p) July, 1992: "Update on analgesia and sedation in the Pediatric I.C.U."
- (q) August, 1992: "Sedation and muscle relaxation in the Pediatric I.C.U."
- (r) October, 1992: "Asthma in pediatric patients."
- (s) November, 1992: "Analgesics, sedatives and muscle relaxants."
- (t) November, 1992: "Approach to the cyanotic neonate."
- (u) December, 1992: "RSV bronchiolitis in PICU patients."
- (v) December, 1992: "Instructor of P.A.L.S. course."
- (w) December, 1992: "Use of analgesics, sedatives, and muscle relaxants."
- (x) December, 1992: "ARDS in pediatric patients."
- (y) January, 1993: "Oxygen transport: physiology and pathology."
- (z) February, 1993: "Septic shock."
- (aa) March, 1993: "Intraventricular hemorrhage in neonates."
- (bb) March, 1993: "Management of increased ICP."
- (cc) April, 1993: "Update on ARDS."
- (dd) April 1993: "Status Epilepticus."

### **DECLARATION OF DR. KANWALJEET S. ANAND**

I am Dr. Kanwaljeet S. Anand, M.B.B.S., D.Phil., FAAP, FCCM, FRCPCCH who files this declaration under penalty of perjury. I am a pediatrician specialized in the care of critically ill newborns and children. I serve as a fully tenured Professor of Pediatrics, Anesthesiology, Perioperative & Pain Medicine at Stanford University School of Medicine, and as Director of the Pain/Stress Neurobiology Laboratory at Children's Hospital Research Institute. For more than 30 years, I have conducted intensive research and study on the development of pain/stress in human newborns, their development during early childhood, and long-term outcomes. I have authored 311 scientific publications (125 in the last 10 years), edited 9 books, and received numerous professional awards. My true and correct Curriculum Vitae is attached. I am personally familiar with Opioid Use Disorder in adult females and Neonatal Abstinence Syndrome and have reviewed the materials referenced below.

The President of the United States had declared a national medical emergency caused by the Opioid Crisis in America<sup>1</sup>. The immediate effects of the Opioid Crisis, however, may be strikingly less consequential when compared to its effects on the individuals who were exposed to opioid drugs prenatally, many of whom were diagnosed with NAS. These children, through no fault of theirs, have been condemned to suffer from the short-term and long-term effects of opioid exposure from birth throughout their childhood, adolescence and into their adult lives. Though the current Opioid Crisis looms large on the thinking of social, medical, or government establishments, but its long-term impact is inestimable because of the pervasive and persistent effects of prenatal opioids on all aspects of an individual's development. Their cumulative burden of suffering, and the total impact of their exposures on all facets of our society is so huge and unparalleled in human history that this is truly the real emergency. Unless they are monitored/supported/treated NOW, the problems of these children will become intractable and unmanageable as they grow into adulthood, wiping away generations of human endeavor because of our short-sightedness. I offer the following statements for the Court's consideration:

#### **Definitions**

- Opioid Use Disorder (OUD) is defined in the DSM-5 as a problematic pattern of opioid use leading to clinically significant impairment or distress. OUD was previously classified as Opioid Abuse or Opioid Dependence in DSM-IV.
- OUD has also been referred to as "opioid addiction" in previous publications. Addiction is defined as a chronic, relapsing syndrome of psychological dependence and craving of a drug for its psychedelic, sedative, or euphoric effects; characterized by compulsion, loss of control, and continued use of a substance despite knowledge of its harmful effects<sup>2</sup>.
- Infants and children are not "users" as defined under the DSM-5 criteria and are excluded from the class of persons suffering from OUD. Regardless, the birth mothers of children diagnosed with neonatal abstinence syndrome (NAS) would be included within the definition of OUD.
- Neonatal abstinence syndrome (NAS) or neonatal opioid withdrawal syndrome (NOWS) are terms used to denote a group of problems that occur in the children who were exposed to opioid or opiate drugs in the mother's womb. NAS is diagnosed clinically based on the clinical signs occurring in the 1 week after birth, characterized by neurologic hyperexcitability, gastrointestinal dysfunction, and autonomic instability. Most common neurologic signs include anxiety, agitation,

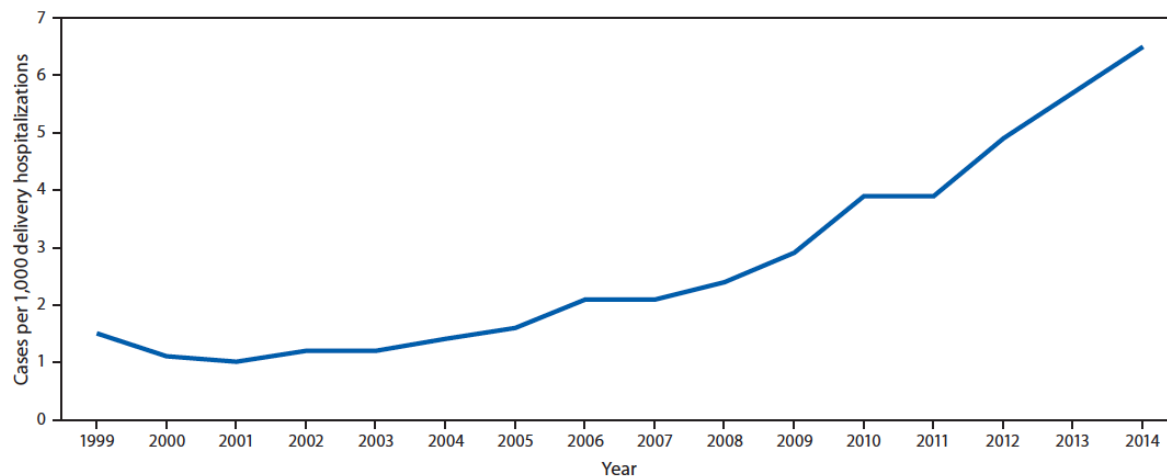
grimacing, insomnia, increased muscle tone/reflexes, exaggerated startle reflexes, high-pitched crying, tremors and abnormal movements, seizures; gastrointestinal symptoms include vomiting, diarrhea, poor sucking, dehydration; autonomic signs include elevated heart rate, respiratory rate, and blood pressure, fever, sweating, mottled skin, yawning, skin excoriation, cold extremities<sup>2-5</sup>.

- Notes: 1. Most clinicians diagnose NAS in children with modified Finnegan score of 8 or greater from two (2) consecutive assessments performed by a qualified healthcare practitioner with a minimum interval of 4 hours between the two consecutive NAS assessments<sup>6-9</sup>. Although the Finnegan NAS was criticized in various publications and alternatives were suggested, however, it is still the most widely used method for making a clinical diagnosis of NAS<sup>10,11</sup>. Simplified versions of the Finnegan NAS scale were developed and cross-validated against the original Finnegan score but did not show any significant improvement in psychometric properties<sup>12-14</sup>. Other methods for making the NAS diagnosis include the Rivers opiate withdrawal tool<sup>15</sup>, the Lipsitz narcotic withdrawal score (cut-off score of 4 or more indicates NAS)<sup>14</sup>, the neonatal narcotic withdrawal index (cut-off score of 5 or more indicates NAS)<sup>16</sup>, and other less commonly used methods. Two recent studies have substantiated the validity of a clinical diagnosis for NAS coded within the patient's medical record at the time of hospital discharge<sup>17,18</sup>. A quality improvement (QI) initiative showed increases in the accuracy and consistency of Finnegan NAS scoring by nurses, but the effects of this training were short-lasting<sup>19</sup>.
2. Although all children born to birth mothers suffering from OUD in pregnancy may or may not show signs/symptoms of NAS or NOWS, their brain development has been altered by repeated exposures to opioid drugs in the prenatal period. NAS signs/symptoms are the clinical manifestations resulting from sudden withdrawal of the prenatal opioid exposure, whereas the structural and functional alterations in their brain cells, connections, and architecture, as well as the brain damage from opioid-induced apoptosis (programmed cell death) occurs long before a child is born. These changes in brain development are permanent and will affect these children throughout their entire lifespan (see below). Therefore, we need to establish a class of individuals who were exposed to opioid drugs prenatally, particularly those who were diagnosed with NAS/NOWS after birth.
3. For the purposes of monitoring and surveillance, therefore, the following objective criteria will identify children with NAS and at risk for long-term neurodevelopmental consequences of prenatal opioid exposures:
- Diagnosis of NAS or NOWS documented in the child's medical record, for example, using the diagnostic codes of: P96.1/P04.49 (ICD-10 CM), 779.5/760.72 (ICD-9 CM)<sup>18</sup>; and/or
  - Monitoring of NAS/NOWS score(s) after birth, meeting the diagnostic criteria as defined above; and/or
  - Postnatal weaning of opioid drugs (morphine, methadone, buprenorphine, or other opioids); and/or
  - Children who are already listed in a national registry or other registries established for NAS<sup>20</sup>; and/or
  - Toxicology screen of (a) maternal blood, urine, or hair analysis, (b) umbilical cord blood, (c) baby's meconium testing positive for opioids (excluding mothers who were prescribed opioids after the onset of, or for the purpose of treating labor pains, or for treating procedural pain).

### The numbers of babies exposed to prenatal opioids annually

- 1) Based on trend analyses for birth mothers suffering from OUD in pregnancy, approximately 36,000 babies are likely to be born with prenatal opioid exposures in 2018<sup>21</sup> (projected using the CDC birth rate data)<sup>22-24</sup>. CDC data show that the documented rate for birth mother OUD was 6.5 per 1,000 delivery hospitalizations in 2014 (MMWR, August 2018<sup>21</sup>). This is a conservative estimate, since it does not include babies delivered at home, at maternity clinics, or birthing centers. Epidemiological studies show that rates of birth mother OUD may be higher among women who use non-hospital birthing centers or prefer delivering their baby at home<sup>21,25-27</sup>.
- 2) Using data from 1999 to 2014<sup>21</sup>, the National Average Annual increase in opioid exposed birth rates for mothers suffering from OUD was 0.39 per 1,000 delivery hospitalizations per year. This estimate averages the increases in birth mother OUD rates over 16 years of collected data, although the rate of increase was much greater in the last 5 years of data collection (Figure 1).

FIGURE 1. National prevalence of opioid use disorder per 1,000 delivery hospitalizations\* — National Inpatient Sample (NIS),<sup>†</sup> Healthcare Cost and Utilization Project (HCUP), United States, 1999–2014



Even using this conservative yearly rate increase (3.9%) will give us prenatal opioid exposure rates increasing up to 8.45 per 1,000 delivery hospitalizations in 2019. However, if we project the prenatal opioid exposure rate increases from the past 5 years, National Average increases show an increased rate of 7.2% or 0.72 per 1,000 delivery hospitalizations per year. This will give us prenatal opioid exposure rates increasing to 10.1 per 1,000 delivery hospitalizations in 2019. These data are listed in **Table 1** on the next page. Table 1 also includes the “corrected” prenatal opioid exposure rates after adjusting for: (1) women undergoing detox before the baby’s birth, whose babies may not show signs of NAS; and (2) those women who do not deliver in a hospital (previous studies have reported higher OUD rates among these women).

### Annual growth rate of individuals at risk for NAS

- 3) More than half (60-75%) of the individuals born to birth mothers with OUD in pregnancy are expected to be diagnosed with NAS as defined above<sup>21,28-36</sup>. Those diagnosed with NAS are more likely than non-NAS individuals to have more significant exposures to prenatal opioids and to have developed subcellular and other physiological changes as a result of such exposures. CDC states that individuals at risk for NAS are “**clearly underestimated and under-reported**” but

the data available from 36 states in 2015 showed approximate increases of 7.2% occurring in each year between 2011 and 2015<sup>21,26,27,37,38</sup>.

**Table 1: Numbers of Individuals at risk for NAS: Trend analyses from 2014 to 2019**

	National Average Increase 0.39/year (1999-2014 data)			National Average Increase 0.72/year (2011-2014 data)			Estimates including babies who detox <i>in utero</i> and those born in non-hospital settings		
	OUD rate/1000 hospital deliveries	Number of live- births: CDC data	Newborn s with prenatal opioid exposures	OUD rate/1000 hospital deliveries	Number of live- births: CDC data	Newborns with prenatal opioid exposures	Corrected OUD rates/1000 live births	Number of live- births: CDC data	Newborns with prenatal opioid exposures
2014	6.5	3,988,076	25,922	6.5	3,988,076	25,922	7.5	3,988,076	29,911
2015	6.89	3,978,497	27,412	7.22	3,978,497	28,725	8.5	3,978,497	33,817
2016	7.28	3,945,875	28,726	7.94	3,945,875	31,330	9.4	3,945,875	37,091
2017	7.67	3,853,472	29,556	8.66	3,853,472	33,371	10.3	3,853,472	39,691
2018*	8.06	3,776,403	30,438	9.38	3,776,403	35,423	11.1	3,776,403	41,918
2019*	8.45	3,738,639	31,591	10.1	3,738,639	37,760	11.9	3,738,639	44,490

\*2018 Number of Live-births estimated with a 2% decrease in births from 2017; \*2019 Number of Live-births estimated with a 1% decrease in births from 2018

### Constellation of clinical conditions associated with NAS

- 4) Opioids are proven hazardous substances for prenatal human development. Thus, NAS is associated with premature birth, low birth weight, intrauterine growth retardation (IUGR), perinatal or neonatal mortality, increased birth defects, delayed cognitive development, long-term behavioral problems, ADHD, auditory deficits, speech delay, swallowing difficulty, gastro-esophageal reflux disease (GERD), digestive or gastrointestinal motility disorders, delayed feeding, failure to thrive, congenital neurological defects, and congenital heart defects<sup>39-45</sup>.

### Time periods of interventions to achieve the best outcomes

- 5) For most of the conditions listed above, the best possible outcomes can only be achieved with proper management of NAS before hospital discharge, coupled with increased monitoring and surveillance, as well as active multi-disciplinary interventions that are initiated just after birth and continued for the child's entire childhood and adolescence (up to 18 years of age)<sup>30,39,46-56</sup>.

### Evidence suggesting that prenatal opioid exposure damages DNA

- 6) Huge amounts of published data substantiate the findings that prenatal opioid exposures alter genetic regulation and DNA structure, although many of these studies were performed in animal models<sup>57</sup>. Almost 40 years ago, however, leading researchers discovered that prenatal opioid



exposure damages human DNA and/or prevents DNA repair occurring from other causes of DNA damage (e.g. UV light)<sup>58</sup>. Since then, accumulating data have shown the progressive and persistent effects of repetitive prenatal opioid exposure on DNA fragmentation occurring in the developing human brain and in peripheral blood cells<sup>58-71</sup>. More recently, several studies also documented the epigenetic effects of opioid addiction, capable of intergenerational and transgenerational transmission to the offspring of opioid addicts<sup>72-80</sup>. Although pregnant women were excluded from some of these studies, the underlying mechanisms are the same and will have extensive effects on the massive amounts of DNA synthesis occurring during prenatal human development<sup>66,81</sup>.

Consequent to the opioid effects on human DNA cited above, a large number of studies have found a higher incidence of birth defects in the babies exposed to maternal opioids *in utero*<sup>45</sup>. Seventeen (17) studies found opioid exposure linked with facial/oral defects (e.g., cleft lip, cleft palate, or others), heart defects (e.g., ventricular septal defects, atrial septal defects, hypoplastic left heart syndrome, pulmonary valve stenosis, conoventricular septal defects), limb deformities (e.g., clubfoot), visceral organ defects (e.g., gastroschisis), or neural tube defects (e.g., spina bifida)<sup>40,41,43-45</sup>. Most of these conditions require multiple surgical operations and long-term medical care to support the optimal development of these severely affected children<sup>43,82</sup>.

### **Long-term cognitive and behavioral outcomes of individuals diagnosed with NAS**

- 7) Brain Development: Opioids have drastic and sustained effects on brain development in the fetal and postnatal periods, affecting the brain's size, architecture, networks and connections between brain cells, neurochemical and other functions of each cell, as well as the brain DNA's structure, its expression and regulation. Thus, prenatal opioid exposures have robust and long-term effects on the cognitive and behavioral outcomes of the individuals diagnosed with NAS<sup>82</sup>. Opioids affect brain development by disrupting oligodendrocyte development, altering the temporal sequencing and quality of nerve fiber myelination<sup>83</sup>, decreasing the growth of nerve cell dendrites<sup>84,85</sup> and their branching pattern complexity of pyramidal neurons in the cerebral cortex<sup>40</sup>, and by suppressing cell proliferation and neuronal migration to the cortical plate<sup>86</sup>. These effects may reduce regional brain volumes in the basal ganglia<sup>87</sup> and other brain areas<sup>87-90</sup>, with lower developmental potential.
- 8) Brain Growth: A large number of studies have reported lower birth weights and smaller head circumferences in opioid-exposed babies with relatively increased risks in those exposed<sup>20,36,87,91-99</sup>. A controlled comparison showed that reduced fetal head and body growth in infants of opioid-dependent mothers were not explained by gestational age, cigarette smoking, area deprivation, infant gender, maternal age or parity<sup>100</sup>. Given the limited maternal/environmental effects on head circumference, it is likely that the robust effects of opioid exposure on head circumference occur by reducing brain growth<sup>82,101</sup>. This was confirmed in a pilot study of 16 infants, where volumetric MRI scans showed smaller whole brain volumes and basal ganglia volumes compared to age-matched population means<sup>87</sup>. In another follow-up MRI study that included 38 youths in the opioid-exposed group and 44 youths in the non-exposed group (aged 17 to 22 years), the drug-exposed group displayed smaller brain volumes, smaller surface areas of the cerebral cortex, and thinner cortical mantles than unexposed youth<sup>88</sup>.
- 9) Functional Effects: The consequences of this impaired brain growth are also pervasive, with altered dyadic interactions between mothers and infants<sup>102</sup>, impaired early development in all domains of the Griffith's Mental Development Scales<sup>103</sup>, impaired visual acuity and visuomotor

functions (eye-hand coordination)<sup>101,103,104</sup>, impaired language-related cognitive skills and executive functions<sup>105,106</sup>, with inattention, hyperactivity, impulsivity, aggression, ADHD, other social and behavioral problems persisting into adolescence and even adulthood in those born to opioid-dependent mothers during pregnancy<sup>88,91,107-109</sup>. Baldacchino et al. identified 200 follow-up studies of opioid exposures during pregnancy, but only 8 studies met inclusion criteria with 4 studies in infancy, 3 assessing preschool children, and 1 on school children<sup>110,111</sup>. All these were case-control studies conducted within urbanized, low socioeconomic communities, with mothers exposed to either heroin or methadone. Five studies had data usable for meta-analysis, with a total of 218 opioid-exposed and 205 non-exposed children. In all outcomes opioid-exposed children had lower scores as compared to controls<sup>110</sup>.

- 10) Neurodevelopmental Consequences: Differences in neurodevelopment between children with and without exposure to prenatal opioids are related to the age at which they were assessed, with milder differences occurring at birth, greater differences during infancy and early childhood but widening gaps noted during school age and adolescence. Individuals with NAS at birth had impaired behavioral regulation, greater excitability and arousal, and poorer quality of their movements<sup>112-121</sup>. Among infants and toddlers, NAS was associated with impaired mental and language development as well as poorer neuromotor and psychomotor development before 24 months of age<sup>122</sup>. Because of the very limited roles for cognitive or executive functions in early childhood, studies performed in the younger age groups showed minimal differences in cognitive or executive functions with and without NAS<sup>123,124</sup> (e.g., every infant is likely to fail an algebra test). In contrast, the Bayley Scales of Infant Development revealed more prominent neurodevelopment deficits, with greater vulnerability among boys than in girls<sup>125-127</sup>. Assessment in later childhood revealed differences in IQ, motor performance<sup>128-131</sup>, language performance<sup>132</sup>, lower IQ scores, behavior and attention problems compared with unexposed children at 8.5 years of age<sup>107,108</sup>. Children exposed to methadone prenatally also had elevated levels of aggression, fear, and anxiety<sup>91,130,133</sup>. Even after controlling for their sociodemographic factors and birth mother's medical history, elevated symptoms of ADHD occurred in children who were exposed to prenatal opioids compared with children not exposed to opioids *in utero*<sup>91,130,134</sup>.

A recent systematic review and meta-analysis of cohort studies of 1,455 children from birth to 18 years found that prenatal opioid exposures negatively impacted neurocognitive outcomes and physical/motor development from age 6 months onwards, and this association persisted until adolescence<sup>135</sup>. The study could not differentiate between the contributions of prenatal opioid exposure vs. opioid treatment for NAS after birth and recommended that all NAS children should receive long-term monitoring, with social, emotional and educational support or intervention<sup>135</sup>. The long-term effects of prenatal opioids on cognition tended to increase over time, even in those children who were adopted or placed in foster care, thus being exposed to minimal postnatal risk factors<sup>107</sup>. NAS children discharged home with their birth mother, despite a longer hospital stay, had a higher likelihood of being referred for early intervention services (81%) compared to those placed in foster care (66%)<sup>136</sup>.

- 11) Executive Functions: Executive functions are thinking skills that help us with the information processing, reasoning, planning, problem-solving, for coping with stress, regulating our emotions and managing our lives. As a child progresses through school, the executive functions assume greater importance in their academic success, goal setting, and employability<sup>137</sup>. Children exposed to prenatal opioids have difficulties with information processing<sup>138</sup>, poorer performance on a

vigilance task<sup>139</sup>, lower overall executive functioning<sup>105</sup>, significantly lower visual acuity<sup>101</sup>, impaired visual-motor and perceptual performances, and fewer goal-directed eye movements<sup>140-142</sup>. Children with NAS were far more likely to have developmental delays and lower IQ<sup>143</sup>, 2.3 times more likely to be hospitalized for neuropsychiatric disorders<sup>144</sup>, 4.5 times more likely to be hospitalized for child abuse<sup>144</sup> and die during hospitalization<sup>144</sup>, perform poorly on educational testing<sup>145</sup>, and show cognitive disabilities requiring extra classroom therapies and services<sup>146</sup>. CDC compared 1815 children with NAS and 5441 children without NAS (age 3-8 years). Children with NAS were more likely referred for disability evaluation (19.3% vs. 13.7%), have a learning disability (15.6% vs. 11.7%) and require classroom therapies (15.3% vs. 11.4%). These differences remained significant even after controlling for maternal smoking, maternal education, birth weight, gestational age, and/or NICU admission<sup>146</sup>. Children with NAS had lower scores on standardized testing in grade 3; by grade 7, children with NAS were scoring lower than other children in grade 5 and showing progressively greater deficits<sup>145</sup>. The increasingly complex cognitive processing and executive functioning required within a competitive high school environment place these children with NAS at progressively greater disadvantage and much higher likelihood of adverse outcomes, thus widening the gap between those with and without NAS.

- 12) **Neuropsychiatric outcomes:** Although Uebel et al. (2015) had found that more children with NAS were hospitalized with neuropsychiatric disorders (adjustment, conduct, anxiety, emotional, or speech disorders), three recent studies have highlighted the very high prevalence and distribution of mental health conditions among individuals with prenatal opioids. Using a Medicaid database, Sherman et al. (2019) found that half of all children with NAS were diagnosed with mental disorder before age 5, compared with 30% of all other births. Children with NAS were more likely to have conduct disturbances (2.7-fold), hyperkinetic syndromes (2.6-fold), adjustment difficulties (2.5-fold), stress/anxiety disorders (1.5-fold), emotional problems (1.9-fold), childhood-onset psychoses (1.7-fold), intellectual disabilities (2.3-fold), specific developmental delays (1.7-fold)<sup>147</sup>. Mental health conditions were 1.6-fold more prevalent in children with a history of NAS than the opioid-exposed children without a history of NAS, and 1.4-fold higher among children with Medicaid vs. commercial health insurance (Table 2 from Conner et al., 2019)<sup>148</sup>. From a longitudinally followed youth cohort (17-22 years) with prenatal opioid exposures ( $\pm$  other drugs) who were adopted/fostered before 1 year of age, Nygaard et al. (2019) found **2- to 8-fold higher lifetime risk of mental disorders** compared to matched controls<sup>149</sup>. These risks mainly included

Diagnosis (ICD-9 code)	Commercial insurance (N=1,405,712)				Medicaid <sup>a</sup> (N=270,772)			
	NAS (N=190)		No NAS (N=1,405,522)		NAS (N=1,046)		No NAS (N=269,726)	
	N	%	N	%	N	%	N	%
Any mental health condition/diagnosis	68	35.8	313,021	22.3	511	48.9	81,814	30.3
Specific delays in development (315)	48	25.3	115,785	8.2	327	31.3	49,591	18.4
Disturbance of conduct (312)	11	5.8	37,120	2.6	113	10.8	10,879	4.0
Hyperkinetic syndrome of childhood (314)	13	6.8	102,770	7.3	94	9.0	9,372	3.5
Adjustment reaction (309)	9	4.7	63,295	4.5	75	7.2	7,799	2.9
Acute reaction to stress (308)	2	1.1	6,995	.5	49	4.7	8,123	3.0
Neurotic disorders (300)	9	4.7	60,749	4.3	43	4.1	7,365	2.7
Special symptoms or syndromes (307)	11	5.8	58,585	4.2	41	3.9	9,672	3.6
Disturbance of emotion specific to childhood and adolescence (313)	2	1.1	23,686	1.7	39	3.7	5,350	2.0
Intellectual disabilities (317-319)	1	.5	2,596	.2	37	3.5	4,074	1.5
Psychoses with origin specific to childhood (299)	8	4.2	26,860	1.9	32	3.1	4,752	1.8

<sup>a</sup> Source: Sherman et al., 2019 (2). Adapted by permission from American Psychiatric Association Publishing.

**major depression, alcohol abuse, ADHD, and aggressive behaviors** even after controlling for age, gender, and caregivers' education. These children not only engaged in sex at younger ages and had **more sexual partners** compared to controls, but also experienced **suicidality** (28.8%), **psychoses** (17.7%), or **antisocial personality disorder** (15.6%) more often than their peers<sup>149</sup>.

Such bleak outcomes portend a future tsunami of neurocognitive and neuropsychiatric disorders among the children and youth with NAS. The Opioid Crisis has increased over the past 20 years; therefore, multiple generations of such children and youth have been affected. While we continue to argue about priorities and preferences, these children are growing up – and every day that passes without the medical monitoring or supportive services being offered to these children, it makes their problems more and more intractable, imposing on them poorer outcomes and greater societal disadvantages.

### **Urgent need for more scientific investigations of individuals with NAS**

Despite the recent flurry of scientific publications on this topic, there are numerous unanswered questions about the epidemiology, risk factors, diagnoses, management, and responses to therapy in the children with NAS. Therefore, there is an urgent need for a court-appointed Science Panel with the imperative to document the long-term outcomes of children exposed to prenatal opioids, through multiple, well-designed, large studies that prospectively enroll adult women with OUD and ensure good retention rates, to longitudinally follow their children with NAS at least until 18 years of age. All these children will require detailed neurocognitive and neuropsychiatric testing, as well as functional monitoring. Such tests are not available during routine doctor visits or other healthcare settings. To be explicit, these needs exist well-above and beyond the routine pediatric care and/or schooling required for non-opioid exposed children. These needs are not currently covered by Medicaid, or any private health insurance or any kind of Special-Ed funding. To obtain such data and to ensure that appropriate therapies and social services are offered, these children require detailed medical monitoring and surveillance through a well-coordinated, standardized, multidisciplinary, and nationally implemented protocol as described below. The results of such monitoring and surveillance must be regularly evaluated by the court-appointed Science Panel, so that accumulating data and scientific insights can be applied to the ongoing care of these children. To inform members of the Science Panel, they must be given access to all scientific and medical studies, data, experiments, white papers, research forms, or other materials related to the synthetic opioids, regardless of whether such materials had ever been provided to the FDA or whether they were protected assert trade secret protection.

### **Protocol for monitoring/surveillance of children diagnosed with NAS**

- 1) Biological variability is based on genetic and epigenetic mechanisms, or factors related to the prenatal opioid exposure that manifested NAS (specific drugs, dosage, period(s) of pregnancy affected, detox or treatment effects, exposures to smoking, alcohol, or other drugs), as well as the postnatal treatments for NAS. All these will influence the child's long-term neurodevelopmental consequences resulting from NAS. Individual differences occurring between humans are difficult to determine specifically, but a common medical monitoring program is absolutely essential for all NAS victims because they are all at high-risk for common detrimental outcomes, associated with 'hidden' or latent conditions and disorders that can be ameliorated through medical monitoring, scheduled assessments, surveillance procedures and appropriate therapies. The proposed monitoring is different from that normally recommended in the absence of opioid exposures and

there is immense clinical value in the early detection and diagnosis of long-term opioid effects. If our societal goal is to achieve the maximal developmental outcomes for all children, then uniform and robust program will be necessary. Although some children might ultimately benefit more than others, however, that can be attributed to a biological variability in response to therapy, other psychosocial factors, or presently unknown factors that require further scientific investigation.

- 2) Children with NAS are at higher risk for a variety of adverse outcomes as noted above. Therefore, they are worthy of a more structured and specialized program of monitoring and surveillance with scheduled extra assessments, for at least two reasons. First, their families/caregivers want to know if their child is healthy and growing and developing normally, and they want to know about the health or other problems likely to be encountered in the future. Special concerns often arise at childhood or social transition points, such as entering childcare or changing school levels, thus requiring careful guidance and advice. Second, most of their developmental problems can be ameliorated or prevented if detected early – identification of high-risk groups for targeted interventions can be both cost-effective and efficient. Multidisciplinary advice from Doyle et al. (2014)<sup>150</sup> was used to design the monitoring protocol as outlined below.
- 3) If these periodic diagnostic medical exams identify a particular deficit or disability, the child's caregivers must be provided access to the specific resources and treatment(s) that they will need to overcome the long-term impacts of NAS. Additionally, caring for a victim of NAS is difficult, associated with increased risks for repeated hospitalizations of the child. An educational program aimed at increasing the understanding of NAS in parents and other caregivers is recommended, including access (or referral) to resources for both the caregiver and the child.
- 4) Barriers for implementing standardized monitoring protocols must be anticipated and addressed. These may include providing funding for transportation to scheduled assessments or making the transport arrangements, providing token compensation to participants, facilitating access by offering home visits or assessments at a location convenient for the parent/caregiver, consideration for living situation, and other barriers.
- 5) Most of these assessments are required annually, unless specified otherwise. Certain specialist assessments may be required only once (e.g., cardiology evaluation to rule-out congenital heart disease), or to be determined by the results of the previous testing – more frequent assessments will be required for the NAS children with abnormal/atypical results.
- 6) The data gained from these assessments must be deidentified, aggregated and securely stored in a state-level database, with query access available to researchers, practitioners, social or healthcare agencies, advocacy groups and others.

In conclusion, implementation of the studies referenced herein as well as the long-term care and treatment of these babies is essential to the resolution of the Opioid Crisis and its impact on our society. This report is based upon the information available at the time it was prepared. With the recent increase in NAS cases, the scientific understanding of NAS and the outcomes of NAS victims continues to evolve. And yet, much work remains to be done, which is the goal of implementing a long-term Court-appointed Science Panel – to study the results of the monitoring and surveillance and to recommend interventions as needs arise. With the Court's permission, I



would like to reserve the right to update this report in order to reflect the accumulating scientific and medical evidence as necessary.

I certify under penalty of perjury that the foregoing is true and correct.

Executed on December 8, 2019.



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Dr. Kanwaljeet S. Anand,  
M.B.B.S., D.Phil., FAAP, FCCM, FRCPCH

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